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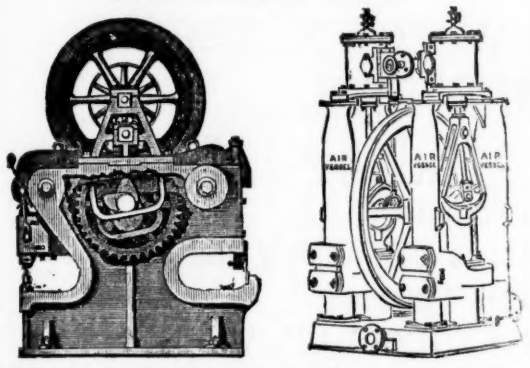

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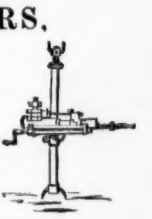

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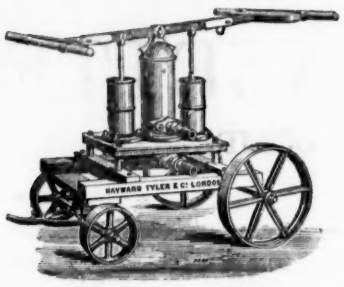

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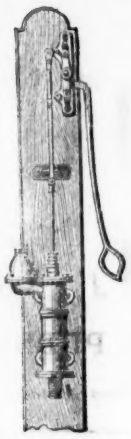

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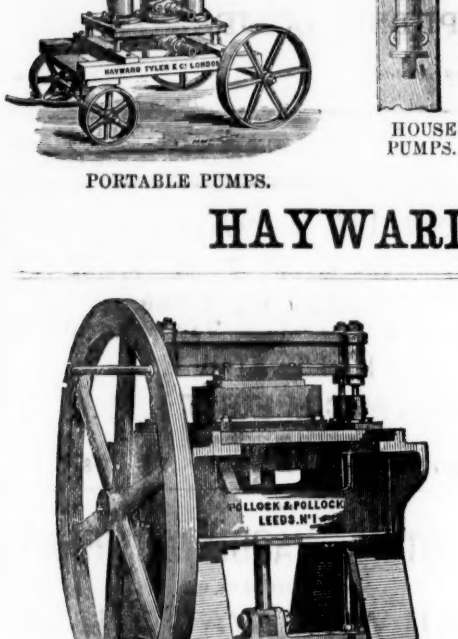

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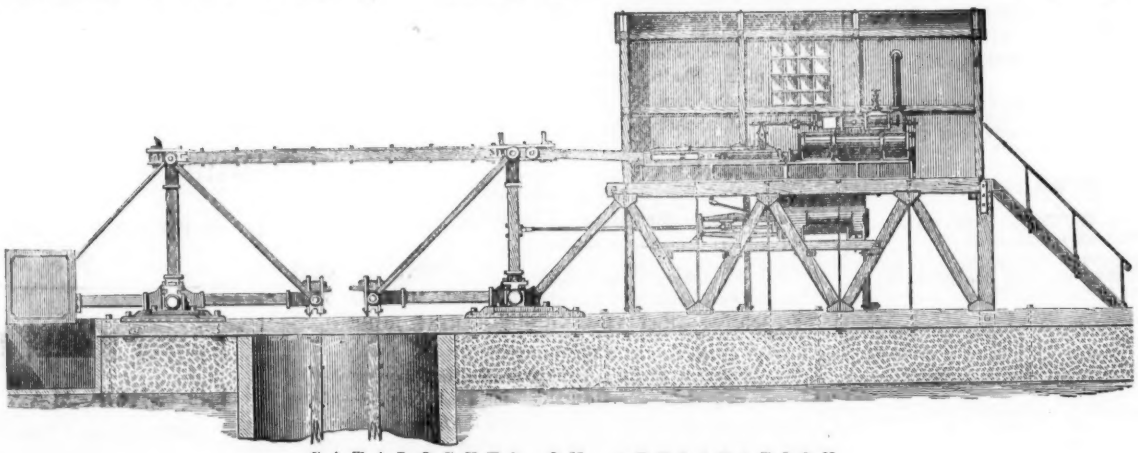

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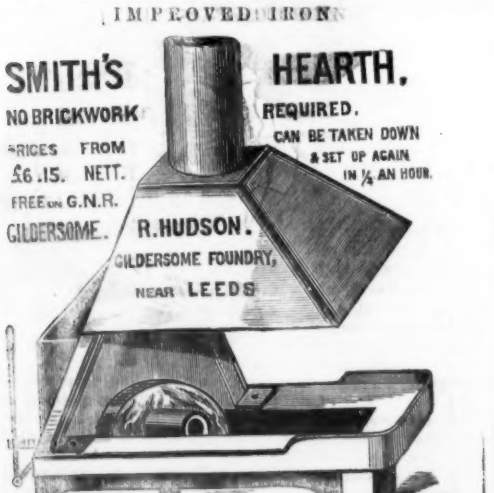

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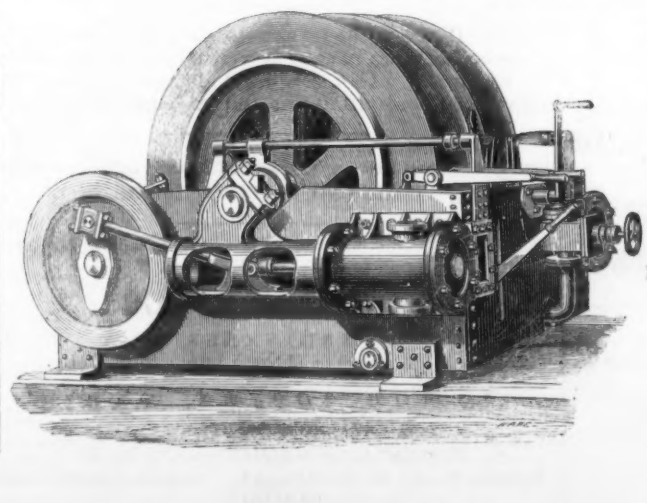

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[This Advertisement appears fortnightly.]

Original Correspondence.

THE VENTILATION OF MINES BY IMPULSION.

SIR,—Many months ago I had contemplated a rather more ambitious literary effort on the ventilation of mines than this purposely short paper, designing then, as now, to specialise my essay by a definition of impulsion, which definition, as implying a project for the ventilation of mines on a principle I sought to have conceded, I meant as of my own devising; but I had not then, nor have I now, the time or apparatus to render my subject scientifically complete. Having had the opportunity of further maturing my ideas on the matter, I am now decidedly inclined to think that my purpose can be best served in a very few words. Treating impulsion as a specialty, and leaving the general question of ventilation precisely as it is, the more so, as I have in the meantime completed arrangements for ventilation by impulsion, and can, therefore, deal with it, not alone in the tentative, but as a practical business, and, therefore, somewhat conclusively. At the time alluded to, as now, men were stirred by the terrible stories of recent colliery disasters, and this is my apology, if apology is called for.

It will be obvious that I am assuming that the one way out of explosions of gas in colliery workings is improved ventilation—ventilation effective, in as much as it is actual and producible by the direct application of ventilating power, not provisional, as almost entirely inter-dependent with collateral circumstances, and that my aim is revolution rather than refinement. I beg to disclaim strict originality. I assume to little more than an attempt to get what has been floating realised. I have selected the name of impulsion for the principle and the method of ventilation I am designing to urge for universal adoption. Impulsion means causing the air to enter the mine to be ventilated by putting on pressure at the entrance of the downcast-shaft—that is, running the air in, as opposed to aspiration, the method now adopted by preference in mining practice of exhausting the mine by a furnace or engine so that a supply of fresh air may enter the rarefied region by a superinduced process of expansion from above ground. Impulsion is the rational method of undertaking the work of ventilation on the surface, assuming a basis of operations on terra firma, at the head of the downcast-shaft, and putting the air down, as opposed to the absurd method hitherto pursued of beginning at the wrong end and utterly destroying the air in part of the mine, and partially in the remainder, so as to promote continuous diffusion by the upcast, and arranging provisionally for a concomitant trade wind to acceded to the place of the air dissipated. Impulsion implies the establishment of normal atmospheric conditions in the mine, and the maintaining of a barometric pressure in the mine atmosphere by the pressure put on higher, sensibly, than that due merely to the depth of the mine—a normal action of air on the walls of the mine as opposed to licking them by flue-draught. Impulsion implies the maintenance in the mine throughout of the indispensable plenum of living air, as opposed to artificial rarefaction as used to promote draughts; motion imparted by a higher potential, as opposed to that obtained as following on dissipation and diffusion. Impulsion as actual and direct ventilation implies conditions decidedly obviating induced currents, and the exudation of gas by super-induced currents. Impulsion means power applied to the air as opposed to provisional purchase.

A deflector on the downcast shaft-head, placed to catch the wind and concentrate it on the pit-mouth, is the ordinary power by which impulsion is effected. While there is wind this simple device can be made to suffice for the fulness of the purpose—at other times a calm-engine will be requisite. I do not feel that I can at all venture on the present occasion to deal in practical details with the matters of deflector, calm-engine, and accessories; but on another occasion my experiences on these and other matters involved shall be forthcoming, should circumstances appear to demand them of me.

I do suppose it scarcely necessary to say a word on the respective or relative merits of impulsion and aspiration. Placed over against each other, as I have (in a way) above placed them, impulsion will decidedly appear rational, and in accordance with simple and direct natural methods, while aspiration, it is apparent, is utterly vicious and abnormal. That aspiration is the all but universal method is unquestionable.

That there is real need of improvement in the business of colliery ventilation is only too painfully evident; that the very perfection, so to speak, of ventilation will be found in impulsion needs few words to render evident beyond doubt. The work of ventilation, so far as the main object of supply is concerned, very rationally, is done altogether above ground, with perfect immunity from all risk and liability to prolonged interruption. The thing is simple, natural, and entirely to the purpose. A deflector is used during wind; the dimensions suited to the strength of the wind and the wants of the mine. I have been disposed to regard a deflector as a sort of telescope; not that the parts slide in one another as those of a telescope, but, like a telescope, it is divided into parts for adjustment sake, so as to facilitate the using of it according to the altering circumstances of the moment; and, like a telescope, the parts are enlarged towards the object end, and concentrated on the pit intake; and, finally, the thing is to be set right "in the wind's eye." During calms—happily for ventilation rare—an engine and intermediary must be used, which machinery must be kept standing by for the purpose. Thus the ventilating power is absolute, having, so to put it, a potential above the atmosphere, and an extra normal atmosphere is made to permeate the workings of the mine by a positive arrangement of movement. The superiority of this arrangement over that of aspiration, which acts by the creation of a potential below that of the atmosphere, and so ventilates by a negative arrangement, which at the time of our best cares may be even then failing, is so self-evident as neither to call for detailed explanation or to admit of question. In my own practice I have found by tests made underground with the barometer (Aneroid) a very sensible factor due to impulsion. I can only point attention to the fact that there is in all this a great power for the counteraction of the extrusion of gases, while the method sought to be set aside is the great promoter of emission. The very serious matter of "induced currents," heretofore too little regarded, is disposed of at once and for ever by impulsion; by the exercise of a very little care the utter impossibity of an "induced current" is permanently secured. The importance of this will be obvious—indeed, striking, when we reflect that, most times, we are doing that greater than Herculean labour—"turning the wind." Under impulsion exit at the upcast occurs as the wind blows.

I do not regard the distribution of the air below ground as any essential of impulsion, it is inasmuch a part of any and every method, but I cannot avoid a reference thereto, as I see through it one of the great characteristics of impulsion; in fact, distribution as such will be so simplified as to render it a matter scarcely calling for more than a formal notice. Doors, stoppings, regulators, and kindred devices may be dispensed with by dozens. Here is a relief! From what I have been enabled to observe in the practice of impulsion, it appears to me that it is not all imperative to "course" the air mechanically. So long as passages are thorough, or in circuits, under otherwise the most seemingly unfavourable circumstances, the air will still act; the habits of it will be found to bear no analogy whatever to those of air following a lead in the wake of draughts converging on a nucleus of dilatation. In the colliery which I have in charge, with ground laid open sufficient for more than 200 men to work in (on one shift), the workings extended around the main shaft on all sides, the extreme faces almost 1000 yards apart, while the downcast and upcast are not entirely 80 yards apart, with the most unstable of roof and floor strata, the deflector employed being small in capacity, simple, and as a first attempt crude, the distribution is effected without the aid of any apparatus whatever. This subtle characteristic, amounting to free distribution, is an invaluable property peculiar to ventilation by impulsion; see what it must be even as a provision against the consequences of a violent displacement of fittings. The dispensing with apparatus it is scarcely necessary to remark constitutes alone a great saving. Indeed, so far as expenditure is an object, impulsion has the advantage all round; the winds are very cheap. To follow up the enumeration of the advantages of impulsion would involve the altogether unnecessary and undesirable (on some scores) consideration in the abstract of a facile, an effective, and an unfailing method of ventilation. There is nothing in the essentials of impulsion which will clash with the essentials of established working systems.

I have advisedly abstained from any but general statements, as to do otherwise would involve the infinite treatment of individual cases by reason of their very diversity, but the principle defined, inasmuch as it is natural, is immutable. As to the practical adoption of impulsion I shall say but one word. It seems to me that the only condition requisite is the due impressing of it on the common thought of our mining communities, and forthwith that it becomes a part of mining thought, that great aggregation of workers to which is owing the greatest advances in applied (perhaps also in abstract) science, will not be found to halt in the progress which leads mining to a future of which its past is an appropriate prelude.

I am sorry that I could not give my remarks a more really practical character, so as to help the individual to the doing of real work while the general body was hesitating over a principle, but if have succeeded in establishing the theoretical superiority of impulsion I shall trust a little time for the remainder and rest satisfied.

Earlshill Colliery, Sept. 25. —— WILLIAM MORRIS.

THE ABERCARNE EXPLOSION.

SIR,—Perhaps there is no question at present before the public demanding more earnest attention or more immediate solution than the question of how to work coal mines infested with explosive gases so as to render impossible those shocking explosions which are happening with such frequency. They happen with such an appalling regularity that we can almost at the beginning of the year calculate how many wives will be widowed and how many children orphaned before its end by their agency. Every explosion is imputed by some to the negligence of the employers, by others to the carelessness of the workmen; but it is evident enough that while mines evolving dangerous gas, the escape of which cannot be regulated or controlled, are occupied by three or four hundred workmen, who carry each of them the means of igniting that gas, explosions may happen, and are certain occasionally to happen, by pure accident, without blame attaching either to employer or workman. And this holds good whether naked lamps be used or whether the lamps be protected by gauze cylinders. With naked lights greater caution is certain to be exercised, but with the greatest caution, and with the strongest current of air which could be sustained without the extinction of all lights, it would be found impossible to work the deeper and more gaseous mines with exposed lights. Safety-lamps, again, are only partially safe. They are only safe under ordinary conditions. A strong current of air may penetrate the gauze, or, if that is provided against, the gauze of some lamp may be worn or defective in some part, which may escape notice, or it may be injured while in the pit. Human fallibility is certain to show itself in this as in all human affairs. Ships are wrecked, factories are burnt down, passenger trains are smashed, and 100,000 British subjects die annually of preventible diseases, and no one in particular is to blame. But these colliery catastrophes have this peculiarity, that they all result from one and the same cause—the bringing of flame into contact with explosive gas. There are, thus, only two factors to be considered—the flame and the gas. It has been found impossible as yet to render the gas at all times harmless, or to prevent it from getting access in certain circumstances to the flame.

Ought it not now to be seriously considered whether it be not possible for science to produce or invent an illuminating power which will light the miners at their work, and yet will not ignite explosive gas even when brought into contact with it? There are said to be mines in China where the miners work by the light of some luminous phosphorescent substance without flame, which emits a light feeble enough, but sufficient for the purpose. The principle of the telephone was known in Asia long before it was introduced to Europeans. Is it not possible that this idea of lighting mines with a flameless substance, if it were taken up by one of our savans, might be carried to a practical issue? Is anything impossible with science? It has accomplished such unexpected wonders in the past that we can scarcely imagine anything too wonderful for it to accomplish in the present. It has again and again effected prodigies which were scouted as absurd when first proposed. Should any scientist take up this subject and carry it to a successful issue, producing an illuminating power that will not ignite explosive gas, he will merit and receive the gratitude of tens of thousands who are in daily danger of their lives, of hundreds of thousands who are in daily fear of losing their bread-winners, and of a nation which is ever and anon saddened, and sickened, and appalled by such dreadful catastrophes as that which has just occurred in South Wales. —— M. J. D.

MAJOR FORD'S REPORT ON THE YARLSIDE ACCIDENTS.

SIR,—Major Ford appears to have been sorely exorcised when he wrote his report on the Yarlside accidents. Things had gone cross with him. He had propounded a theory to the Coroner's jury, and illustrated it by an experiment made in their presence, and they not only rejected his theory but returned a special verdict that the accidents arose from a different cause to that suggestion by him. Galling this to a scientific officer of Major Ford's standing, holding an important office under Government, and he winces under it. He, nevertheless, returns to the charge, and so satisfied is he of the correctness of his own theory that he reasserts it in spite of the verdict and of the evidence on which it was founded, and avails himself of it to bring a very serious complaint against the directors and managers of Nobel's Explosives Company, and charges them with publishing a misleading advertisement, and declares that they "incur a grave moral, if not legal, responsibility in respect of all similar accidents," implying that they ought to be arraigned for manslaughter. A serious charge this, and let us see on what foundation it rests. The facts appear to be shortly these. Two accidents occurred in sinking a new shaft in Yarlside Mines—one on May 14 and the other on July 7 last, and on each occasion one man lost his life. In each case the men were sinking in limestone, intersected in parts with cracks, spongy in appearance, and admitting of water flowing through them.

Dynamite was the only explosive used, and the only question was whether the accident arose from the drill coming in contact with an unexploded cartridge, or with nitroglycerine, which had exuded from some of the cartridges consequent on their having remained for a length of time in contact with water. Major Ford attended the inquest, and exhibited to the jury the contents of a cartridge, which he deposited in a tumbler of water, and explained his theory of exudation. To use his own words, "he explained to the jury of what dynamite is composed, and the action of water upon it, showing them the effect of placing a cartridge in water;" and he adds, "they were for the most part practical miners, and appeared to be glad to learn the nature of the explosives they were accustomed to handle, and how risks were to be avoided as far as possible." The inquest was adjourned, when further evidence was produced, from which it appeared that 10 shots had been fired, or attempted to be fired, by electricity within two days of the accident, and no means had been taken, or were usually taken, where blasting by electricity was resorted to, to ascertain whether all the cartridges had exploded or not. Major Ford was not present at the adjourned inquest, and may not have been acquainted with all the facts; but he states in his report that "for a time, after the first accident, firing several shots together by electricity was attempted, but at the time of the second explosion this had been given up," from which it must be inferred that he was aware of the failures which had taken place in the attempts to fire by electricity, and he omits all mention of the want of caution in ascertaining whether all the charges had been fired or not, though he is very particular in doing so when the men used ordinary time fuse.

The jury, according to the report in the local papers, returned the following verdict:—"That the deceased met his death by an explosion at Yarlside Mines, and were of opinion that it was an old unexploded charge of dynamite which being struck had caused the accident." Impartial persons may perhaps think that the jury came to a correct conclusion, but Major Ford had himself given evidence and propounded his theory of exudation; and, losing sight of the other evidence, he says that "an agent of Nobel's Explosives Company was present, and stated that, in his opinion, the accident was caused not by exudation of nitroglycerine, but by the bit having come across an old unexploded charge, and the jury appear to have concurred in this view." That the local agent of Nobel's Company should have presumed to offer an opinion differing from Major Ford and in opposition to his theory of exudation, appears to have given great offence, and hence the virulent attack on Nobel's Company, who he charges with "publishing misleading statements calculated to bring about accidents, by imparting false ideas of the properties of the material they make; and he presumes they adopt this course to make the most of their own explosive at the expense of others." Grosser and more offensive charges could not well be brought against any body of gentlemen.

And now as to the ground on which he rests and tries to support these charges. He asserts that "week after week an advertisement still appears in at least one of the mining journals that dynamite is unaffected by damp." This report is dated July 27 last, and if any of your readers will refer to the advertisements alluded to which appeared in your Journal only, they will find that Major Ford's assertion is—and I forbear to use a stronger and more appropriate word—and will only say knowingly inaccurate. The advertisement did not state that "dynamite is unaffected by damp," but "its explosive properties are unaffected by damp." So far from misleading parties using dynamite as to its safety when exposed to damp it cautions them that its explosive qualities are not injured. Such caution became desirable in consequence of the publication of several Harbour bye-laws with the sanction of Government after their approval, as it is understood, of the Inspectors of Explosives, wherein parties have been told that if any dynamite escapes from a package it must be destroyed by placing it in water. Major Ford well knows this cannot be done; that water will not destroy or render dynamite inexplosive, and if he had denounced these bye-laws as being misleading, and calculated to bring about accidents by imparting false ideas of the property of dynamite, he would have been justified in doing so, but nothing of the kind; on the contrary, they receive the sanction of the office of which he is one of the responsible heads. That he should venture to misquote a public advertisement for the sake of founding thereon the groundless and infamous charges he has thought proper to bring against Nobel's Company appears to be most astounding. I venture on no further comment at present. Parliament is in recess, and the courts of law are not now setting, but we may possibly learn at no distant date whether Mr. Secretary Cross approves the issuing from the Home Office of untruthful libels, and whether the authors can claim protection for them as privileged communications when, as in the present instance, they show malice on the face of them.

London, Sept. 23. —— LOOKER-ON.

LONDON COAL SUPPLY.

SIR,—Lincoln, soon after the Norman Conquest the favourite residence of the Norman sovereigns, ships of great burthen at that time ascending the Witham with the tide to the city walls, possesses a central position of the greatest importance in the transit of Nottinghamshire, Derbyshire, and Yorkshire coal to the Metropolis, no county in England being so well supplied with canals as Lincolnshire. Lincoln is in the enjoyment of navigable communication with the ocean at Boston Deeps and precited coal fields, presenting an uninterrupted communication by water from the coal pits to London.

Lincoln has also direct connection by rail with the coal pits in the three counties through the Midland and Manchester, Sheffield, and Lincolnshire systems; neither of which are tributary to another railway for or mulcted with an abnormally high rate for a short lead, as is the Great Northern. As stated in my correspondence in your issue of July 20 France has the most extensive network of canals in Europe, and official returns show that notwithstanding the exuberance of railway facilities by far the largest quantity of coal is delivered by water transit in Paris. Official returns prove that for German coal transport nothing can compete with the water route. With five parallel railways the Erie canal transports at a cost of 0·268 cents per ton per mile, exclusive canal dues, against 0·923 cents per rail—*vide* State Comptroller's (United States) Report, January, 1875.

The transactions of the Institution of Civil Engineers, Paris, shows that coal from the Belgian coal field to Paris can be carried at 0·008 fr. per ton per kilometre. The general manager of the Midland, as shown in my letter in your last week's issue, stating that during the coal war between the Midland and Great Northern, when, according to the Times, a terrific loss at the rate of 300,000*l.* a-year was made, it cost the Midland 0·250d. to 0·265d. per ton per mile an immeasurably higher rate. The Midland will augment their revenue by following the example of the North-Eastern by shipping the coal output of their district *via* Lincoln to London, if they do not wish to witness the total absorption of their London coal traffic by water *via* Lincoln and Boston Deeps. Is the metroplitan coal consuming public any longer to be mulcted to the extent of 2,000,000*l.* sterling per annum, or capitalised 50,000,000*l.* to benefit the railways, &c.? Are the so-termed inland coalowners to submit to the deprivation of their indisputable and unassailable monopoly which they are destined to enjoy through the geographical, &c., position of the London coal supply to the great public benefit.

Is that meritorious body of men the coal whippers and tankmen of the East of London to be ground down, so that lately ½d. per ton actually formed the dispute between their employers and them? Are the less favoured classes—the million—as is fully proven, to be hurried away to an untimely grave through want of firing by the nefarious existing system? the Registrar of the Coal Exchange stating in evidence that "the fluctuations in the price of coal in London are due to taking advantage of any opportunity to do so to the benefit of the factors or merchants, principally the latter." Lincoln, through direct communication with Boston Deeps, which will be rendered, through augmented harbour, &c., dues, accessible at all states of tide and weather, by no means necessary for coal traffic, will supersede Hull, Grimsby, Goole, Lynn, and Sutton Bridges, heavily weighted with docks, all entailing immense detention and expense, especially on steamships with general good cargoes, with whom dispatch is the *unum necessarium*. Lincoln's closer proximity to Manchester, Birmingham, Sheffield, &c., gives it also a great advantage over aforesaid ports.

WILLIAM JOSEPH THOMPSON.

6, *Fitzwilliam-road, Clapham, Sept.* 26.

ABORTIVE COMMERCIAL UNDERTAKINGS.

SIR,—Deluded by what I now consider specious and mendacious prospectuses and reports, I became a shareholder in the following concerns:—

Universal Disinfector Company.
Clee Hill Colliery Company.
Welsh Freehold Coal Company.
Thornhill Reef Gold Mining Company of Australia.
East Balleswidden Tin Mine.
Wheal Tregoss Tin Mining Company—merged into the New Fowey Consols.

Without exception the above companies have been or are in the course of being "wound up," and it appears to me that all have been projected with no other view than to put money into the pockets of vendors, directors, and managers, without considering the possibility of making returns to the public. How otherwise should it happen that no accounts of the liquidation should have been issued, and not a shilling returned to the shareholders from the sale of plant, &c.? Surely the whole subscribed capital and the (in several cases) expensive plant cannot have been absolutely lost.

Doubtless many others have suffered with myself, and my object in writing you is to announce to my co-shareholders my willingness to aid in exposing, and if possible punishing, those through whose machinations we have apparently been duped. But I am not without hope that a rigid enquiry into the origination and management of the companies named might produce tangible results, as in the case of the Burrow and Butson Tin Mining Company, whose shareholders recovered a portion of their capital through the energetic

action of one of their number. I shall feel obliged by your giving this letter a place in next week's Journal. A VICTIM.
Sept. 23.

ROCK DRILLS.

SIR,—Not having a desire to enter into a discussion of what may be called paper trials, we have so far refrained from addressing you on rock drills; our object, therefore, in now doing so is to explain a statement made by Mr. Waddington in the Journal of Sept. 14, in which he states that seven years ago he saw the Burleigh drill tried, and bore at the rate of 6 or 7 in. per minute, and no machine he has yet seen has bored quicker. With this part of his statement we fully agree, but the point upon which we wish to enlighten him is wherein he states "that he does not know of one (Burleigh drill) now at work in this country." We desire to inform him that there are at the present time some hundreds at work, and if he will refer to our advertisement in the *Mining Journal* he will see that some of the most eminent firms in the country have adopted them, and are increasing their use after severe but satisfactory trials. Regarding the statement of Mr. Schram relative to our machines being in competition with his own, we beg to say that we never sent our rock-drill to any such trial, nor had we any invitation to do so, or even an intimation of such being held; and as we can hardly credit Mr. Schram of such a statement, we shall be glad if he will inform us who supplied the Burleigh drill for the trial, and under whose charge the same was carried out. Instead of praising his own invention, and enumerating trials of a few minutes duration, would it not be better if he would give some practical results of tunnelling, shaft sinking, and quarrying, such as the average progress, cost, &c., compared with hand labour.

THE BURLEIGH ROCK BORING COMPANY (LIMITED).
King-street, Manchester, Sept. 24.

ROCK DRILLS.

SIR,—For some weeks past we have carefully read the repeated remarks of Mr. Schram about the superiority of his rock drill over all other drills.

We beg to repeat our challenge given through the medium of the *Mining Journal* several months ago, to run our Eclipse drill against any other drill for three, six, nine, or twelve months' trial, on the terms set forth in our previous correspondence.

If Mr. Schram has sufficient confidence in his drill to compete with our Eclipse drill we shall be glad to hear from him or from any other of the rock drill proprietors.

May we ask how it is that Mr. Schram, having such a high opinion of his drill, did not compete at the Paris Exhibition trial before the Society of Engineers and other scientific gentlemen, to bore a block of black porphyry specially sent for the occasion?

In conclusion, we wish to have the verdict pronounced by competent judges in the mining world and by others thoroughly qualified to test the merits of rock drills and air compressors—Which are the best machines of the day?

It is for this purpose that we have persistently insisted—as we do now insist—that all rock drill and air compressor proprietors and inventors should come forward to a grand competing trial of some months duration, in order to prove the superiority of either of these machines—Which is the best rock drill, and which is the best air compressor?

Having now fairly thrown down the gauntlet we shall be only too delighted to see it taken up, and so have set at rest the vexed question *(vexata quæstio)* that has puzzled, and is now puzzling and distracting, the minds of engineers, mine proprietors, railway tunnel contractors, and others interested in the use of these machines—Which is really the drill of the day, and the compressor of the day?

30, *Charing Cross, S.W., Sept.* 25. HATHORN AND CO.

ROCK-BORING MACHINERY.

SIR,—It was our intention not to have taken any further notice of whatever Mr. Schram might say about the Ingersoll rock drill, but his letter in last week's Journal is so pointedly written that we think it only just to ourselves to say a few words. Mr. Schram seems to eschew the axiom "that things that are equal to each other are equal to the same;" for, though his drills in use at the Magpie are larger cylinders, and have a longer stroke than the 2⅞ in. Ingersoll sent to that mine, and, consequently, of greater cubical contents, yet he says they consume a less volume of air. He states also that the Ingersoll would not work except at 65 lbs. pressure, whilst his machines work admirably with from 35 to 40 lbs. Does he mean by this that the Ingersoll is of such bad workmanship that its friction beyond the ordinary friction of any well-made machine is equal to 50 per cent. of its normal working consumption of motive-power? Had Mr. Schram written this once only in the heat of controversy we would have let it pass; but, as he reiterates it, we can only put it down to the reason we gave in a former letter—that he makes statements without verifying facts. Mr. Schram contradicts our statement that our drill was not represented at the trial at Flenu, and says he was at the unpacking of the drill, but he does not state if he saw it work there. We had only a small machine at Flenu, taken there at the last moment by our Brussels representative, who, finding that the competing drills were all large ones, decided not to run our small one. We, therefore, repeat that we were not represented at that trial. In the matter of the Magpie Mine, we are quite content with what we said in our former letter.

LE GROS, MAYNE, LEAVER, AND CO.
Queen Victoria-street, Sept. 25.

BORING MACHINES.

SIR,—That Mr. Schram, failing any argument or proof of superiority in his drill, should seek refuge in attributing attacks through jealousy, ignorance, or illwill is nothing more than I expected. My experience of boring machines may or may not be co-extensive with Mr. Schram's, and I may see that his drill is nothing more than a copy of machines whose patents have elapsed, and even hold the opinion of more than one practical engineer that there is no maintainable patent in the said machine. Your readers of the Journal are well aware of the interest I have taken in the application of boring machines to hard ground mines in Cornwall. I have no interest direct or indirect in any machine. When an interested party makes a statement through your columns that his machine will work at less pressure than any other he presumes upon the credulity of your readers in the absence of any proof whatever. There is not a machine working of the same size and properly made in equally old or new condition under like circumstances that will not work as well as Schram's machine. To doubt this betrays ignorance of what has been done and is doing. The *vis inertia* of a drill can only be once overcome by power, the work done in the stroke due to the momentum of the drill is but the reflex of the force employed, to claim more stamps an attempt at imposition.

Schram's drill of 3¼ in. in diameter, with a pressure of 40 lbs. per inch, represents a power of 332 lbs., to which add momemtum acquired in its downward course. An Ingersoll or any other machine of 2⅜ in., at a pressure of 60 lbs. per inch, represents but 294 lbs. and momentum, but an Ingersoll or any other machine of 3¼ in, is equal to Schram's, length of stroke being equal. Where, then, is the saving? It is in employing a machine of 3½, 3¾, or 4 in., and working at a pressure of 30 to 40 lbs. per inch. An air compressor will fill two reservoirs to 40 lbs. almost as soon as one of similar capacity to 65 lbs. No Schram's machine ever worked at 100 per cent. less than another, nor would any engineer who knew what per cent. meant say so. This statement, like many others, is characteristic. The statement of there being a considerable loss of power by conveying air 1200 ft. at a very slight rise in an adit level, where the water will only run from accumulated force behind, is alike misleading; there is no considerable loss. At a distance of 1300 or 1400 ft., by changing pressure gauges, I have proved an increased pressure of 3 to 4 lbs. per inch to exist over the pressure in the air reservoir.

I may know nothing of limestone, though for 30 years I had it daily before my eyes, nor yet of the Magpie Mines, although there years before Mr. Schram ever heard of it; but this is descending to the childishness of Mr. Schram, which I have no desire to flatter. Let Mr. Schram try his machine on the tin lodes, or the tin capels, or the Cornish granite or greenstone, before he attempts to give an opinion on a subject he has evidently never studied. I have no desire to wound the feelings of any man, much less an old man, like Mr. Brokelhurst. My remarks disputing his testimony are founded on experience and fact, which Mr. Schram admits—that there are drills that will work at 7½ lbs. to the inch. What sense, then, can there be in the testimony of one who says they work at 35 to 40 lbs., and less than any other, when all who have had any experience know that in easy ground it is an ordinary pressure. Let us adhere to the truth if we wish boring-machines to be adopted throughout our mines, for by that we are more likely to succeed than by exaggerated statements. H. WADDINGTON.
Sept. 24.

MID-DEVON MINING COMPANY—ROCK DRILLS.

SIR,—Kindly allow me to correct an inaccuracy in your report in last week's Journal of what I said at the meeting of the Mid-Devon Mining Company. Your report says that—"Mr. Roberts mentioned that he had seen the rock drill at work at the Botallack Mine." What I said was I had seen the rock-drill at work at Falmouth on a piece of rock from the Botallack Mine. Permit me also to correct an inaccuracy of my own. I stated that the drill went through 12½ in. of that rock in 5 min. and 40 sec.: I ought to have said in 7 min. and 40 sec.—*Sept.* 24. THOMAS NICOLLS ROBERTS.

COMBINED RAIL AND WIRE TRAMWAY.

SIR,—I think I have examined most of the systems of wire tramway, and in many cases the introduction of this mode of transport, but all must have come to the conclusion that they are only adapted for short lengths, and for such purposes as conveying minerals down a mountain side or across a deep gorge, and that on level ground nothing is so economic as the ordinary rails. But the combination proposed by Mr. John Deuce, of Mark-lane, might in some cases render the tramming of minerals more convienent than at present—that is to say, I think there is the germ of an idea in his proposition, although his method of attempting to reduce it to practice would never succeed, which may account for his having abandoned his invention after securing provisional protection. He appears to me to have attempted his improvement in the wrong place. In his invention of February of the present year he claims improvements in the wheels of carriages, ballast wagons, or trucks (tipping or otherwise) arranged to travel either upon ordinary rails or upon wire standing ropes, inclined or otherwise. He places the inclined wire standing ropes close to the outside of the rails, where they are securely fixed or anchored. The wagons, having combined flanged and grooved wheels (which constitute one of the chief features of this invention), gradually and safely mount the inclined ropes, and are hauled to their destination. The hauling rope is attached to suitable safety apparatus attached to the fore or after part of the carriage, so that in case of the rope breaking the truck would remain stationary, securely held to the inclined ropes by means of safety apparatus, as described in one of Mr. Deuce's former inventions; or other similar safety apparatus may be employed, thus preventing the wagons from running down the incline, and thereby avoiding injury to persons and property. For this purpose, in carrying out the invention, the body of a truck or wagon of suitable size is hung upon trunnions (placed slightly above the centre of gravity when loaded) on a frame of wood or metal provided with suitable bearings for trunnions and axles of wheels. The combined wheels are formed with an ordinary flange for running upon rails, and with a groove on the side like a grooved pulley to run upon the inclined ropes or other inclined surface, being thus adapted to run either on ordinary rails or wire ropes. The ends of the rails where they join or approach the ropes or incline are bent and inclined upwards, so that the truck or wagon is gradually transferred from one travelling surface to the other without sustaining any shock, and upon its arrival at the upper level it may either continue to travel on wire ropes or be shunted on to tramways as may be required.

By way of recommendation of his invention Mr. Deuce states that by his improved construction of the combined wheels a wagon or truck is capable of running safely on both rail, rope, or other incline, the safety apparatus preventing accidents in ascending the incline. By this means the body of the truck may be used as a wagon travelling on ordinary rails for ballast or other purposes, as well as for the purpose of a skip, thereby saving the outlay of ordinary ballast wagons, and avoiding the necessity of discharging the trucks into their skips for ascending inclines, thus reducing the cost of labour, and in the working of gold or diamond mines or other valuable minerals less risk is incurred from loss by theft in transit. But, in my opinion, Mr. Deuce is entirely wrong in his conclusions, probably because he does not fully appreciate the value of the late Sir Isaac Newton's discovery of the law of gravitation. With a tramway made of rails and laid upon the ground or other rigid support it is permissible to have the centre of gravity above the level of the line, because, from the very fact of the line being rigid, the centre of gravity can never assume a position vertically beyond the base of the wheels. In the case of a wire tramway, however, it is widely different, because a comparatively small deviation in the motion of the load causes one or other of the ropes to stretch sufficiently to change the centre of gravity to a dangerous extent, which, were Mr. Deuce's invention in use, would inevitably precipitate the wagons and their valuable contents into the gorge beneath. But the difficulty is not without a remedy, and this remedy was suggested by Mr. Charles Hodgson, the original inventor of wire tramway about 12 or 14 years ago. He himself used rigid sections for the purpose of transferring the load from one wire tramway line to another; but he was careful to construct the rigid portion in such a manner that the load was always below the rails on which it was carried.

It will, no doubt, be said that this remedy is only applicable in certain cases, and that nine times out of ten it would be altogether impracticable to keep the load constantly below the rails carrying it. Admitting this, there is an infinitely more simple method than that prodosed by Mr. Dence, and one, moreover, which would be much less costly, as no special construction of wheel would be required, and the additional fixture to the truck would cost less than 2*l*. The ordinary tram would merely require four wire tramway carrier-pulleys to be affixed to it, and the ends of the rails would be turned down instead of up, as Mr. Deuce suggests.

By this means not only could the common rope haulage be used, but even a small automatic locomotive could be employed, a small detent being provided to cut off the steam at a suitable distance from the journey's end. It will readily be understood that by the arrangement mentioned the transfer from the ropes to the rails would be effected by the lower wheels taking on to the rails, and so gradually carrying the upper wheels away from the ropes, while on the opposite transfer the upper wheels would take on to the ropes, and gradually lift the lower wheels off the rails. STEEL WIRE.
City, Sept. 24.

YOUNG MEN'S FARMING ASSOCIATION.

SIR,—My attention has been drawn to a paragraph in the Journal relative to the above association. I do not complain of the criticism, which has, on the whole, a friendly tone; but would wish you to permit me to say a few words in answer to the main charges you make against us. I have not found enquirers generally speak of the prospectus as ambiguous. I shall be glad to explain any point on which there seems want of clearness. The reason that the number of each class of share is not stated is that we have only as yet registered 2000*l*. We, therefore, possess sufficient land to make the grant we promise to 18 shareholders. As soon as we have secured that number we shall register the remaining amount, and divide our capital into—

400	... ...	£100 Shares	... ... £40,000
1,000	... ...	50 „	 50,000
10,000	... ...	1 „	 10,000

Before that we shall have purchased considerably more property. We are, in fact, at present negociating for two farms of 3000 and 4000 acres adjoining. Be assured that we shall always have on hand land to meet our liabilities, and, as you justly remark, with the confidence of the public secured, should succeed—I will say more, must succeed. I trust that I have been sufficiently explicit.
Coleman-street, Sept. 24. ROBT. BROCK, Sec.

MINING IN NEW SOUTH WALES.

SIR,—The mineral wealth of New South Wales is so vast, and the interest taken in our Exhibit at Paris so great, that I venture to assume your readers will also be interested by the following notice of "The Annual Report of the Department of Mines for New South Wales for the year 1877," just issued, a copy of which has been kindly sent me by the minister (the Hon. W. H. Suttor), and which I now forward you for general reference.

This is the fourth report that has been compiled by Mr. Harrie Wood (the Under Secretary for Mines) since the establishment of the department in the latter part of 1874, and even we are only just beginning to realise the great value of the information about our own resources thus condensed for general use, the idea and practical embodiment of which we owe entirely to the continuous efforts and trained experience of the under secretary, who for the first year or two had to work uphill against the discouragement of indifference and apathy from the very classes his labour was principally benefiting, and who did not at first see how deeply they were interested in his success.

The first of these, under the style of "Mines and Mineral Statistics," was published in 1875, and brought all the information then available respecting the quantity and value of the minerals won from our mines up to the end of the year 1874; and, besides the statistical, contains a large amount of other valuable information respecting the mineral deposits of the colony. Since then Mr. Harrie Wood has compiled an Annual Report, showing the progress made during each of the years 1875, 1876, and 1877.

From the last of these (the report just issued) it appears that we have raised minerals to the value in the aggregate of 46,439,130*l*. In considering this sum as the result of our mining operations it must be borne in mind that the number of miners in the colony (last year less than 15,000, including those employed in our collieries) is totally insufficient to effectively work even the small area of our mineral lands already tested—and that area, as compared with the extent of our known deposits, is altogether insignificant—and that the mining plant in the colony is also quite inadequate. With the exception of our collieries it may be truly said that we have not yet entered upon systematic mining. It may be true that some few of our gold, copper, and tin mines are now being worked on a better system and larger scale than formerly, but it is questionable whether there is one gold mine in the colony where the work is conducted on the best system, or where the most approved labour-saving or gold-saving appliances are employed. The Star of Peace, Reefing claim, at Hill End is, perhaps, about the best; but then this is the only instance where a thoroughly able man of business, like the principal proprietor (Mr. A. Fairfax), has devoted proper attention and energy to it—and in sluicing, Neuman's claim, at Araluen, is the only other instance of continuous energy and skill properly applied.

The gold we have won has been got as a rule by means of the rudest appliances, and that which could not be reached by such means still remains to be unearthed, consequently our yield of gold does not in any way satisfactorily indicate the extent and richness of our auriferous deposits. The report contains the results of an analysis of a number of samples of waste materials from our gold mines, and this information is valuable as indicating how much of our gold has been lost, and will continue to be wasted, unless our miners employ the proper appliances to treat such material, and save it for future treatment. In Victoria there are 37 works with machinery valued at about 40,000*l*. for the treatment of pyrites, &c., and I find that from 1864 to 1877 there were 309,770 ozs. of gold won from quartz tailings and other refuse, and that from 1869 to 1877 there were 120,301 ozs. won from pyrites and blanketings. Thus in Victoria nearly 1¾ million sterling has been got from material which in this colony is as a rule treated, or rather left alone, as worthless, although we are at last beginning to look into this ourselves, as a Mr. Masters, a practical and scientific worker in these refuse matters, has just put up works near Lucknow for their special treatment, and has already astonished the natives by experimental results from some of the abandoned tailings.

As an evidence of the permanence of our quartz lodes Mr. Wood points out that in the only mine in which a quartz vein has been tested to so great a depth as 850 feet below the cap or crown gold was found in sufficient quantity to pay well for working. He estimates that our stanniferous deposits cover about 8500 square miles, and that only about 8 square miles have been opened up. Some small areas of stream tin may have been exhausted, but our tin lodes have scarcely been touched beyond proving their value at various points. He says that our cupriferous formations, so far as at present known, cover some 6713 square miles, and he estimates that that area will be doubled by future discoveries. As evidence of the value of our copper lodes, the report contains the results of analyses of a number of samples of copper ores made by Professor Liversedge, from which it will be seen that the percentage of metallic copper in the oxidised ores tested varies from 9·48 to 49·27, and in the pyritous ores from 3·07 to 27·49. And some of the samples of auriferous and argentiferous copper ores contain a high percentage of gold or silver, in addition to a good percentage of copper (notably the Goodrich, with its 60 feet "blow," which is now standing idle, because the owners have not the knowledge of how to treat the blended ores). The following are a few examples—one sample contains 27·06 per cent. of metallic copper, besides 21 ozs. 19 dwts. 16 grs. of metallic silver per ton; another sample contains 23·16 per cent. of metallic copper, besides 25 ozs. 12 dwts. 20 grs. of metallic silver per ton, and 0·43 per cent. of metallic cobalt and 7·40 per cent. of metallic nickel; another sample contains 25·79 per cent. of metallic copper, besides 1 oz. 11 dwts. 7 grs. of silver and 14 ozs. 10 dwts. 6 grs. gold. Yet we find that many mines containing these rich ores are idle, owing probably to the want of skill or appliances to treat such ores successfully.

The Boorook Silver Mine, near Tenterfield, partly proved this. The reefs were opened for gold, but as the battery only got from ½ to 1 oz. per ton (or about that), the Sydney Company (400 miles away) abandoned it; private enterprise then stepped in, and a Mr. Horton, with one or two men, worked them for a bare living, puzzled all the time why the quicksilver "sickened" so at times. He being an intelligent thoughtful man, guessed some other minerals might be blended with the gold, gets it assayed, and finds some analyses showing over 500 ozs. of silver per ton; some of course less, but all of them a high percentage of silver, besides the gold. On crushing (number of tons not known) last month by the ordinary means gave—free gold, 18 ozs.; free silver, 331 ozs.; and a second 195 ozs. more; and yet, although the reef is a big one apparently, the probability is no capitalist here will have the enterprise to put up the proper works for scientifically and successfully treating it.

It is evident from a perusal of the annual reports referred to that great improvements have been made in the modes of raising and dressing stream tin ore since our tin fields opened in 1872; but still, in view of the reduction in the price of tin, greater improvement at our mines, and greater facilities for bringing the ore to market, are necessary in order to render them profitable. The severe drought, which it is hoped has now terminated, and the low price of tin and copper, had a most depressing effect upon the mining operations of 1877, yet, notwithstanding these serious drawbacks, Mr. Wood shows that during the year we raised minerals to the value of 2,233,161*l*., being an increase upon the output of 1876 of 50,065*l*., and as compared with the average annual output for the past ten years an increase equal to 173,128*l*. The report contains a number of interesting and valuable tables, amongst others one showing the output of coal during the past ten years, the quantities sent to foreign and intercolonial ports, and consumed in this colony respectively during each year, and the average prices per ton realised. The table shows that our coal trade is growing steadily, the

annual value being more than doubled in the ten years. The report also contains the results of analyses of certain samples of coal from the several coal fields, and attached to it (p. 209) is a report by Inspector Liversedge upon the theoretical calorific power of the samples of coal.

Reference is made to the boring operations now in progress to test the depth of the coal seams underlying Sydney, and the opinions of the Geological Surveyor and the Inspector of Collieries as to the probable depth of the seam are given. Attached to the report are geological maps of the coal field at Hartley and Bowenfels and the gold field at Oberon, sections of coal seams, and a map of the Vegetable Creek tin field; also reports of our Geological Surveyor and the gold fields and coal fields officers, &c.

As many English investors are, or are likely to be, interested in our mines, it may not be out of place to mention that in any coal ventures laid before them they should look to the locality specially, because our southern coal (*i.e.*, south of Sydney) is essentially a steam one, and the demand, therefore, is not unlimited. Of our northern coal (*i.e.*, Newcastle) the Wallsend seam is the one which tops the market for general purposes all through the colonies and in America, and also in the East generally. As to this, as far as is known, its area is comparatively restricted to a three or four mile belt, and that as the various mines near to Newcastle are being rapidly worked out (and the trade is growing) the most profitable extension for the future must be beyond the present Wallsend Company, although, of course, there may be, and probably is, coal equally as good to the westward beyond the known limits of the seam at present prospected.

In gold, copper, or tin it should be made one of the conditions of purchase that no money or shares should pass to the vendors until the mine had been opened up to a certain extent and so much ore raised (before expensive works were erected) as would fairly prove the probable value of the mine. This would not cost the intending purchasers more than 1000*l.* in most cases, and if it proved the property valuable the result of the outlay would be all to the good; and if it proved it to be worthless the loss would save them from an infinitely greater one in the long run.

There was a gold mining company floated in London called the Fuller's Reef, which had it only have taken this simple precaution would have been wiser, and certainly not sadder, to-day, but after spending freely enough on their property they have now suddenly stopped, just when the expenditure of a few hundreds more would very probably lead to success, as when work was stopped a shoot of gold was actually known to be "coming in." I have this on the very best authority (Mr. J. Weston, a gentleman of high honour and good standing here), who has lately been on the property, and, therefore, for the shareholders there really is apparently a good-looking chance now at a small risk—*verb sap.*

In conclusion, it may naturally be asked, why this colony seeks foreign capital to develope its mines? The answer is, the banks are giving 6 per cent. interest on fixed deposits. Bank and insurance shares are paying from 12 to 25 per cent., house property and mortgages pay well, and every squatter almost is glad to take loans at good interest, and gives a really good security (generally speaking) for them, and the losses during the late mining mania were so frightful, and all the money nearly pocketed by promoters and adventurers, leaving nothing to help open up the property, so that there is literally nothing now to show for the outlay, but all experienced miners say that had only half the money raised been spent in legitimate mining the results would have been such as would have placed the mines of New South Wales in the front rank as a safe investment. R. D. ADAMS.

Sydney, New South Wales, July, 1878.

MINING SUMMARY.—There is nothing remarkable to record from the mining districts. The principal yield of gold at Hill End has been obtained from the Star of Peace claim. In Herman's they secured 1500 ozs. of fine specimens, the exact richness of which has yet to be tested. From other parts of the Star of Peace there is a fair quantity of stone to be crushed. The new Lady Belmore continues to yield rich stone in the new shaft and adjoining their north boundary. The quantity crushed has been less than usual, and, omitting the return from the Star of Peace, the yield obtained averaged about 1 oz. per ton. At Parkes a company has been formed for the purpose of testing deep ground with the boring machine. Gold has been discovered in the neighbourhood of the Wallaroo Ranges, about six miles from Cowra, and some 50 or 60 men have gone to test the richness of the find. The Yalwall Quartz Mining Company, at Shoalhaven, have realised 74 ozs. from their last chrushing of 72 tons of stone, maintaining their average, and the mine is still looking well. From the Barrington Diggins the news is still encouraging. One lot of 29 tons of stone realised 110½ ozs. of gold, and there is some other quartz, about 100 tons, estimated to go from 5 to 20 ozs. to the ton. A reef containing silver and gold has been found at Bolivia, in the Glen Innes district, and a sample tested shows a result of 4 dwts. 11 grs. gold, and 2 ozs. 13 dwts. silver per ton. The mineral indications of the neighbourhood are favourable. The accounts to hand from the Boorook silver reefs continue of a satisfactory character. A new reef called the Silver Age has been opened up and is said to promise well. The gold quartz from the Bethanga diggings yielded a less favourable return, and it is expected that gold mining there will soon be a thing of the past. But the copper lodes hold out and look as favourably as ever. All the furnaces are in active operation, and the quantity of regulus dispatched every week shows no sign of diminution. The output of coal from the Newcastle collieries for the fortnight ended the 26th inst., amounted to 55,994 tons, of which 10,147 tons were shipped to Sydney and New South Wales ports, 12,316 tons to Victoria, 4874 to South Australia, 6811 to New Zealand, 607 to Queensland, 2838 to Tasmania, 5506 to China and Japan, 4703 to San Francisco, 3480 to Eastern ports, 531 to New Caledonia, 310 were taken by steamers, and 1411 were raised for home consumption.

RICHMOND MINING COMPANY.

SIR,—The correspondent whose letter appears in last week's Journal with the signature "Shareholder" asserts that "a year ago the mine was dividendless, closed, explorations stopped, and the mine said to be worked out," and that "it was coincident with the appointment of the committee that Mr. Probert caused explorations to be continued in the very ground in which, upon taking over the management a few months before from Mr. Rickard, he ordered explorations to cease."

A statement so shamefully false made by an anonymous writer would not be worth refutation, but that the report of the "committee" contains a like charge as to Mr. Probert's checking explorations advocated by Mr. Rickard, in proof of which the following quotation from his letter to Mr. Probert is given:—"I think our future plan of working in the deeper levels will be to drive on the quarzite and cross-cut at right angles to the ore bodies; even on the quartzite we may find large bodies." I have seen a copy of Mr. Rickard's complete letter, and find that the extract from it given in the report was preceded by the following paragraph:—"Your ideas about the ore bodies in Ruby Hill quite agree with mine, and the more I see of the hill the more I feel convinced that there may be ore bodies anywhere between the quartzite and upper shale, and"—

It will thus be seen that not only was Mr. Probert's letter of advice and instruction as to these explorations suppressed, but Mr. Rickard's echoing answer and approval converted into a demonstration against Mr. Probert's judgment by a quotation commencing in the middle of a sentence. The charge of ignorance of the nature of the ground and careless indifference as to its vigorous exploration is equally false in its application to the old board, I had very strong opinions on these points, based on Clarence King's admirable report, and my subsequent study of the workings, and always advocated explorations in all directions, suggesting that the ground should be tested all over by the Diamond drill. In answer to letters of mine bearing on these questions, Mr. Probert, in a private letter to me, dated May 29, 1875, makes the following remarks: "I should have had a drift in from the bottom of the Look-Out shaft in this incline long ago but for one thing. I did not want to make a discovery in the direction of the eastern boundary of the Look-Out and Margaret that might run down into the Utah ground, and thus induce our neighbours to push their works in that direction, and perhaps get into the Utah by way of the Margaret ahead of us. We had, too, enough to do in following our main ore body downwards, and it seemed politic to continue sinking where we were safe in our own limits, and so develope a powerful lode, about the ownership of which there could be no question. The upper ground could well afford to await future explorations, but the time for them has been precipitated by the discovery of our neighbours, and now we have recommenced driving for it from the Lizette tunnel.

"At the same time another important exploratory work which I had long ago contemplated, and which has received Mr. Rickard's sanction, has been commenced. This is to drive from the 200 foot (main shaft) level south-westerly towards the reef of quartzite which crops out on the south-west side of Ruby Hill (below Emersley), passing right under the present 'flat chamber,' and then onwards under the old worked-out ground till the quartzite is struck. It is very possible that there may be other bodies of ore in this direction, to say nothing of what may be in the 'Tip-Top' ground, which the drift will also partly explore; and it would not be doing justice to the company's property to leave the work unexecuted longer."

The shareholders will soon be better able to appreciate the gross injustice of attributing to the "Committee of Investigation" results due to the foresight and judgment of those previously entrusted by the proprietors with the conduct of their affairs.

Sept. 26. JOHN ELLIOTT.

RICHMOND MINING COMPANY.

SIR,—I am sorry to find that Mr. Elliott should still continue to mislead the shareholders by incorrect statements, and by trying to misrepresent the object of my former letters. Shareholders who have carefully read my letters will find that I have not attacked the mine on its intrinsic merits, but the management of it. I have stated, on the strength of facts which are beyond disproof, that shareholders never were told that the actual control of their property had passed out of the hands of the directors into the hands of the trustees of the Nevada Company. They never were informed as to the nature of the bye-laws of that company, which give the president, or in his absence the vice-president, autocratic powers at Eureka. They did not know that all three of the trustees of the Nevada Company occupied a position wherein their self-interests must, or may, conflict with those of the shareholders—Mr. Probert in running the refinery, Mr. Price as commission agent for the purchase of coke and sundry stores, &c., for the company, and Mr. Wren in all legal difficulties, out of which heavy fees arise, such as those from the lawsuits of 1873 and 1877. They did not know that the board had not only by the proxy power given to Mr. Probert, but by the still stronger power given to the president of the Nevada Company by its bye-laws, surrendered the control of the property. They did not know that Mr. Probert had the power to make a contract binding on the company for a term of five years without the knowledge and previous consent of the board. They did not know that Mr. Probert possessed such influence and power over the board as to tell them to suppress the official accounts for the half-year ending February, 1876, and not to allow certain information and reports to be given to the shareholders because they would reflect on the management. They did not know that Mr. Rickard, their supposed manager, was in the employ of the Nevada Company on a monthly agreement only, and could be dismissed at any time at the will of the president, who could appoint another in his place for a term of years without even consulting the directors. These, and many more, facts of a most serious character have been entirely withheld from the knowledge of the shareholders, and yet I am astonished to find that Mr. Elliott, as late Chairman, and quite *au fait* as to all past Richmond affairs, could write in the Journal of the 21st inst. as follows:—"On technical or legal grounds it might, perhaps, be stated that the English board, in giving their power to Mr. Probert, had parted with direct control while that existed; but as that power could be withdrawn instantly, the English directors could with a safe conscience continue to legislate as if no such power existed, and draw their fees without compunction."

Mr. Elliott knew that the bye-laws of the Nevada Company gave the president autocratic powers, and, therefore, until these bye laws are amended the directors cannot regain direct control of the property and of its management by withdrawing the proxy power held by Mr. Probert, The president under these bye-laws holds quite an independent position, and can act, if he pleases, without the consent or co-operation of his co-trustees, which no chairman of an English company can do. How the directors ever allowed such bye-laws to stand without having them altered and amended passeth all understanding, especially as the laws of the State of Nevada do not require them to be of such a character. Mr. Elliott writes there is "no shadow of dark ways or tricks" in all this. But he knows well enough that the original requisition by a number of the largest shareholders for the appointment of the late committee of investigation contained a clause for the enquiry "into the company's title to its property in America," and that the board refused to agree to this power being given, and so it was struck out of the resolution for the appointment of the committee before the shareholders in general meeting in August, 1877, were asked to pass the same. Not very long ago (since the committee's report was issued) Mr. Elliott told me that the reason why the board refused to allow of any enquiry into the title to the properties in America was because there were certain facts connected with it which if made generally known would most seriously jeopardise its very existence. Mr. Elliott may try in his peculiar way, by sophistry or otherwise, to explain away what he said to me, but I am positive as to the utterance of the above statement, and it is borne out by the fact that the original requisition was amended in this respect, as well as in the striking out of the executive powers asked for.

Mr. Elliott could not but know he was making a wrong statement in writing that "the evidence of Messrs. Probert and Wren was given in February, 1877, at which date, during Mr. Probert's attendance as a witness at San Francisco, he left Mr. Brereton in charge at Eureka," because he knew that this first suit was tried at Eureka before Judge Cole, and therefore Mr. Probert was there, and not in San Francisco, and at that time I was not in charge of the property, and was not at Eureka. Mr. Elliott further writes—"The evidence at the trial was fully reported in the Eureka Sentinel; Mr. Brereton doubtless, therefore, read it at the time of issue. That evidence was laid before the committee of investigation." Now, I never read or knew of that evidence until the end of July last, and after I had seen the Sentinel of June 27 last, which was the text of my letter of the 10th ult. I know that evidence was never before the committee, and I do not believe that any member of the committee had the smallest knowledge of its existence. It is absurd to suppose that the five gentlemen who signed that report, with all the recommendations affecting the management of the company's affairs in America, could have done so knowing that evidence and the true nature of the bye-laws, with the autocratic powers of the president of the Nevada company. If they had known this they would have alluded to it in their report, and have altered many of the clauses in their list of recommendations, which under existing conditions are absurd. On August 23, 1877, Mr. Elliott informed the shareholders that he and Mr. Hopkins, as trustees for the debenture-holders, held in their interests "a mortgage over the whole of the assets of the company, and in fact over the whole of the property." Now he writes, on the 21st inst., that this mortgage "was only for 50,000*l.*, and for a short term." In his former statement he inspired the shareholders with the belief that, whatever might arise from the lawsuit then pending, this mortgage was full and complete security; now he minimises this security to 50,000*l.* only, and to a short period, even a few months.

I entirely differ from Mr. Elliott in thinking that the continuance of the present existence of the Nevada Company is the first consideration. I hold that the first consideration should be the alteration and amendment of the bye-laws of that company, so that the directors may regain their control of the property and management; and, secondly, to obtain an Act of the Legislature of Nevada to enable aliens to hold property in that State on equal terms with citizens. I think it very bad policy to rush the mine as it has been during the past year. The Eureka Company may be able to rush their mine because they are in a very different position to the Richmond Company. The majority of the shares of the former company are held by a few individuals in San Francisco, who can control the market for them when and as they please. It is a matter of little consequence to them whether they pay 16s. to 20s. per day for labour, because the miners, as a rule, speculate in the shares, as do the saloon keepers, the fast women, and all those who live in the mining camps; and, consequently, often one-half and more of the money paid in wages finds its way back into the pockets of those who control and manipulate the shares on the market. But this is not the case with the Richmond, as there is no market there for the English company's shares, and the shares of the Nevada Company, being nearly all held by the directors of the English company, are out of the market also. Notwithstanding that lead has fallen in value 3*l.* per ton, and silver 7d. per ounce within the past 12 months, wages and materials have not come down at Eureka, so that in rushing the mine at the rate of nearly 50,000 tons, or 25,000 cubic yards a-year, as has been the case during the past twelvemonth, a vast outlay is involved in the present high prices of labour, fuel, and materials, besides the expense of keeping up a very large and highly paid staff of officials.

By taking ore out more slowly, and keeping the reserves well ahead of the consumption, better working results and far more economy will follow, and in the long run the *bona fide* shareholders will receive far larger amounts in the shape of dividends. The more the mine is rushed, and the more extravagant the management, the better pleased will be all those who now, in the shape of wages, fat contracts, stores, &c., absorb the bulk of the riches of the Richmond Mine. Mere speculators will also, of course, applaud this rushing and temporary large results, because they are able to rush the shares up far beyond the real value of the mine, and then sell out at handsome profits to the witless public. It is for the *bona fide* shareholders to consider this matter very seriously, and to say whether they will endorse the rushing of the mine regardless of expense, and whether they will allow their property to be wasted so enormously. Let them read carefully Mr. Rickard's weekly reports on the mine from August, 1877, to date, and then look at the glass model of the mine in the office, on which, I presume, all the workings of the past year are properly recorded, and with this evidence before them they will hardly fail to see how their mine has been "gutted" during the past twelve months. They will see that from above the 200 down to the 400 and below the ore body has been stoped out, and but for the recent discovery on the 500, which shows that the ore body is making down, there could have been no reserves in sight for another season's run for the three stone furnaces. Even this discovery in the 500 has yet to be developed before the extent and value of the body of ore can be appreciated. I question very much if Capt. Tonkin, who is now at the mine to examine and report on the reserves, will find over three months' ore in sight for running the three furnaces.

I see that Mr. Gutierrez, writing in last week's Journal, mentions the Sierra Nevada Mine in connection with the Richmond and the Eureka Consolidated. The Sierra Nevada Mine has no possible connection with the Richmond and Eureka lode, as it is situated on the great Comstock lode, which is more than 300 miles to the west of Eureka. I notice the Eureka Consolidated shares remain steady at from 7 to 8, although the mine is producing much larger quantities of ore than the Richmond, and the dividends from it continue steady at 30,000*l.*, or 12s. per share per month, and which have continued without fail since August, 1877.

It is said that large orders have come from the other side to buy on the recent discovery in the 500 level of the Richmond. It should be remembered, for I know it to be a fact, that parties on the other side of the Atlantic never buy except as a speculation. They gamble not on the merits of the mine, but on what they from past experience have found to be the unlimited credulity of the British public whenever any new ore body is discovered.—*Caveat emptor.*

Sept. 27. R. M. BRERETON.

THE RICHMOND MINE—MESSRS. F. W. MANSELL AND CO.

SIR,—Of the serious litigation between the Eureka and the Richmond Companies, the first information was communicated to shareholders by this firm. Although officially denied at the time, subsequent events only proved the information to be too true. Now, Messrs. F. W. Mansell and Co. are the first to advise shareholders of a "splendid discovery." No official intimation has been published, but the shares have risen in aggregate value something like 100,000*l.*

Sept. 27. SHAREHOLDER.

THE ENGLISH LEAD TRADE.

SIR,—In last week's Journal you inserted a letter from Mr. John Owen, of Bishopsgate, headed "The English Lead Trade," but upon that subject the information given is very limited, and it seems, indeed to be intended as a sort of puff of Cardiganshire Mines, and contains several allusions to the Lisburne Mines, the property of a private company, held by a small number of partners, who certainly require no puffing nor criticism of Mr. John Owen, whoever he may be. He seems to have obtained figures which have little to do with the British Lead Trade, but they will have slight effect upon the minds of those "who are seeking really sound investments in profitable lead mining." It is believed in this neighbourhood that there are but very few mines which at the prefent price of lead ore can make any profit whatever, whilst there are many that are losing money; in fact, mining never was at so low an ebb in Cardiganshire as at the present moment. The last paragraphs of Mr. John Owen's letter are, however intended, simply insulting to those who have so ably worked the Lisburne Mines. The Frongoch Mine was 34 fms. deep when the company purchased it, and about 120 fms. long at the time the property was purchased. It has been carried down to a depth of 150 fms., and the levels extended from its western boundary for a length of 475 or 500 fms. The large quantities of ore were not extracted only from the shallow levels, but from several deep ones.—*Aberystwith, Sept.* 25. AN OBSERVER.

THE CORNISH MINER AT HOME AND ABROAD.

SIR,—I notice in your valuable Journal of August 3 an article on "The Cornish Miner at Home and Abroad," which seems to have been brought before the meeting of the West Wheal Frances Mining Company. In the first place, the question seems to have been whether Cornish miners can do more work than what is being done by them. Looking at this matter square, it is only astonishing that some of your very able mining captains and correspondents have not agitated this matter long ago, and brought it to a proper bearing much more to the profit of the mining companies and greatly to the advantage of the miners.

Capt. Abraham James, however, seems to believe it is a very difficult matter to get a proper day's work out of Cornish miners at home; that he knew them to be lolling about, as it were, till half-past seven and eight o'clock in the morning before starting work, and by twelve o'clock they are ready to quit. If Capt. A. James is in a position to treat with those men for a mining company as agent, it would only be in justice to his employers to ask him whether he thought Cornish mining can stand such ridiculous modes of working, independent of the ruinous prices obtained now for the metals produced? Capt. Josiah Thomas, on the other hand, says his men in Dolcoath cannot come up before the eight hours were up, as the engine did not work; but I cannot believe any man holding the important position in the mining circle and other ways that Capt. J. Thomas does actually believes that his men are working faithful simply because they are barred down in the mine, but let him consider the old adage—"One man can lead a horse to the water, but ten cannot make him drink." Do justice to your men, Captain, and they will do justice unto you. You can then throw aside one half of your mining captains under you, and work your man-engine whenever it may be found necessary. In order to arrive at this word justice it is only a very small amount of work to accomplish.

In the first place—as a general rule, exceptions, of course, in all cases—that Cornish miners are, and have been, working under what is commonly known as "the making-up system;" work as hard or as easy as they choose they are given to understand that just so much a month is allowed them, which they can have, but no more, and in order to arrive at this ruinous mode of working very short contracts are let to the miners. I have known as many as three or four contracts being given in one month, and the prices fixed for them accorded with the amount of money or wages already earned. Under this system you will plainly see that one man has no better chance than another; it matters not how much more competent he may be nor how much more he may feel inclined to work. In many public works, even on a large scale, the whole establishment is oftentimes in a nut shell; and by having overseers men can be got to do a middling day's work in a day, even if hired on daily pay, and without contract. Mining, however, you know is a very pecu-

liar branch of industry. In a mine working even on a small scale the forces are so much scattered, and underground in so remote places that overseers cannot command their business and say they are doing justice. In this case you will agree with me, no doubt, that contract work is the only principle whereby miners can be induced to do a fair day's work for a fair day's pay—that is, long contracts. For instance, in sinking a shaft let the contract extend from one level to another at so much per foot or fathom; in drifting, let the contract extend so many feet or fathoms as the nature of the place will allow. Let the same apply to any other point of work, and not give three or four contracts in one month, nor even let any contract for any given time, but let each and every contract be for so many feet or fathoms; and wherever contracts will last two or three months or more, measure at the end of each calendar month the amount of ground opened, and pay the men accordingly.

In letting these long contracts to miners, the agent on all occasions should tell the men about how much per month he would price those contracts for them to get; and when the contract was let he should also give them to understand that the sooner their contract was finished the more they would get, and the longer the contracts were in hand the less wages they would get, and that the price of the next contract he should offer them would by no means be influenced by the amount earned on the present one.

By adopting the above and last principle in employing miners in Cornwall I am confident that an average of 1*l.* per fathom could be taken off the present prices paid throughout the county, and the miners earn from 20 to 25 per cent. more wages.

Lake Superior, Sept. 5. A CORNISHMAN.

PS.—With your permission I will touch upon Cornishmen's wages in America in my next.

COPPER MINING.

SIR,—I am an unfortunate holder in several copper mines, English and foreign, that for years past have not paid dividends—indeed, hardly paying working expenses. They should—I mean the managers should—study the management of the Cape Mines, and then, perhaps, we may get some little return for our money. Year after year we are told at the meetings of these copper companies that there would have been a dividend had it not been for the low price of copper. Now, whether high or low, the Cape Company manages to keep up its dividends simply because every year it keeps down its expenses to meet the fall in the price of the metal. If it did not do so it could not keep up its dividends. I am afraid there are too many mining companies which consider they have done enough when they have earned the directors' fees and office expenses, to pay which the mines only seem to be kept open. This is not as it should be. If the Cape Mines can return 12 or 13 per cent. on the price of their shares, surely many other copper mines could, even in these times, be made by judicious economy to pay (say) 50 per cent., and not leave their luckless shareholders without any return for their money. I admit the times are bad, but we see in the Cape a mine that prospers still through the determined efforts of its directors to keep down expenses without detriment to efficient working. There is no reason why the same thing should not be done by other companies as well. I trust the directors of these companies may take these lines to heart, or resign their management into more able hands. To go on year after year producing copper at a loss is not only most unsatisfactory to shareholders, but is highly injurious to the copper trade itself, which without such unremunerative production, frequently leading to bankruptcy, might otherwise revive from its torpid condition, which is greatly owing to unremunerative over-production.—*London, Sept.* 25. W. W.

SOUTH CONDURROW, AND WHEAL GRENVILLE.

SIR,—Though we were not favoured with a reply to my letter of Aug. 7, it is evident from the proceedings of the late general meeting, reported in the *Mining Journal*, that my views respecting the junction of the two lodes at the western shaft were correct. The Chairman is reported to have remarked that the lode in the 160, in the bottom of the shaft, upon being opened upon had not turned out so favourably as was expected. This, we may conclude, means that the junction has proved a failure, as twelve months ago I predicted it would. I shall be much surprised if the second junction, at the northern shaft, which the adventurers are now anticipating, proves anything better. Great hopes were held out of the riches to be expected at the junction in this western part of the mine—hopes which I ventured to show, by a few indisputable facts and a little common-sense reasoning, there was nothing whatever to justify. Now, the management deplores the unsatisfactory prospects of the ground westward, but says that "the mine is opening out fairly well going east, in which direction we are sanguine of opening up a great mine."

This management has all along been characterised by this sanguine temperament, added to a restless desire to burthen the surface of the mine with all the machinery and buildings they can induce the adventurers to consent to, but I fail to see that they have utilised in any manner the very excellent position they said they found the mine in both underground and at surface when they accepted the management. That the company have a long extent of ground westward I admit, but unless the lode in that direction entirely changes its character from what it is below the 140 in the western ground the adventurers had better not place much faith in a "great mine" being opened up there. Besides, in my opinion, the large engine recently erected is badly placed to command the eastern ground. As the levels are extended other shaft or shafts will in all probability be necessary, and as the levels approach the old abandoned works of East Wheal Grenville the great increase of water which will most assuredly be met with may require further pumping power to cope with it, and it will then be seen that I was equally as correct in condemning the erection of the present expensive machinery as I was in my prognostication respecting the 'junction." The adventurers are asked to concur in the view that as South Condurrow on the north and South Frances on the east of Wheal Grenville, and both working upon the same lode, are profitable mines, Wheal Grenville must also become a profitable mine. But this by no means follows. The character and productiveness of the lode in the first-named mines are altogether different to that of the lode in Wheal Grenville; but more than this, the management of two mines have not made the grievous mistakes nor committed the reckless follies which have all along marked the present Wheal Grenville management. Those errors and follies are palpable enough to any disinterested eye and mind, but the adventurers, it seems, continue to be blind to them, although one would think that each succeding quarterly result of their executive's proceedings would long ago have removed the film that obscures their vision and judgment.—*Camborne, Sept.* 24. PETER PROVIS.

THE LATE CAPTAIN JOSEPH VIVIAN.

SIR,—Your columns of last week recorded the death of one universally regretted—Captain Joseph Vivian. Born in the last century—the last of his school, yet not last or least in all practical improvements relating to mining in all its branches,—one whose services were sought and appreciated at home and abroad, whose unostentatious demeanour, ever ready to give his assistance and advice in questions of difficulty—which endeared him to all who were fortunate to possess his acquaintance. Your columns have borne testimony to the desire that some genuine evidence should be bestowed while he lived. Times have not been propitious; mining, miners, and adventurers alike have suffered severely, and although the heart yearned in many to testify to the appeciation of his unimpeachable conduct during a long life, he has gone without that public recognition.

His memory still lives, and will endure while the present generation has its faculties and being. For generations yet unborn, let a committee be formed which shall decide the form of monument commemorative of one who won such reverence that shall in future point to the straightforward course, and prove to them the truth of the proverb "A good name is rather to be chosen than great riches." A few friends in the City have expressed a desire to subscribe to some such expression as above suggested. I shall be happy to further to the extent of my ability such intention.

76, *Old Broad-street, E.C., Sept.* 25. H. WADDINGTON.

THE LATE CAPTAIN JOSEPH VIVIAN.

SIR,—Those of your numerous readers who knew Capt. Joseph Vivian, of Roskadinnick, Camborne, will be sorry to hear of his decease. He died on the 20th inst., aged 87 years. He enjoyed good health nearly all his life, but he died from natural decay, retaining his understanding, I believe, till the last. I saw him for the last time a few months ago, when he appeared cheerful and of sound mind and memory. No mine agent now alive, I think, had the management of so many mines as Capt. Vivian, and I believe none were better qualified for such undertakings. I admit that many of the mines with which he was connected were of the unproductive class; but they were not all promoted by him. He was asked to manage them. He did promote some mines—South Condurrow is one of them, and that mine has turned out to be a prize. The first mine in which he was an agent was North Roskear, where he remained about 50 years. While he was there the profits divided between the shareholders amounted to about 110,000*l.*; and during that period the dues paid to Mr. Pendarves amounted to about 100,000*l.* During the last few years of his management the mine was in a failing condition, calls being necessary to meet the cost. The majority of shares have been purchased by London speculators. Capt. Vivian was ousted from the mine, but with no advantage to them; for the mine continuing poor it was abandoned, and I suppose that it will long remain dormant.

Capt. Vivian (amongst other mines) managed the following:—North Roskear (already mentioned), and I think South Roskear adjoining; Tryphena, South Condurow, and West Stray Park, which would pay probably if worked again—it was abandoned because the pumping power was insufficient, and the late Sir W. Williams, who had a large interest in the mine, would not go to the expense of a new engine; East Seton, North Crofty, North Pool, East Alfred Consols (Gwinear), Mellanear (?), Sydney Godolphin, St. Aubyn and Grylls, Trevena, Wheal Helen, Tolcarne, New Dolcoath, Carne Camborne (?), West Kitty (St. Agnes), and several others which I have forgotten.

His judgment in mining matters was considered so sound that he was frequently in request to report on mining properties in England, America, and on the Continent of Europe. He was very clever in mechanical arrangements. He was also what Dr. Johnson would call a "companionable man," full of anecdote, good humour, and intelligence. He was very good to the poor, and very fair in setting to the miners, being willing that they should have reasonable earnings for the amount of the work done. Captain Vivian had 20 guineas per month nearly all the time he was manager at North Roskear, and numerous salaries besides, but as he was a large speculator in progressive mines, and never sold a share, I doubt whether he netted much from his numerous agencies. I think that the calls must have swept away most of his revenue from those directions. He was a tolerably large farmer, and in conjunction with his son, Mr. Joseph Vivian, he carried on the flour trade, so that he lived in comfort and respectability. He made Roskadinnick a beautiful residence. His son, Mr. W. C. Vivian, who has lived there with his father many years, will, I suppose, continue the occupation. Captain Vivian was the mineral agent of Sir R. R. Vyvyan, Bart., and of Mr. Pendarves.—*Truro, Sept.* 25. R. SYMONS.

P.S.—I think it was at my last interview that Captain Vivian was speaking of the locomotive engine invented by Trevithick, which he saw tried in Camborne town about 70 years ago. What a wonderful improvement has the engine undergone since then!

Epitaph to be placed over Captain Vivian's grave: "Here lie the remains of an honest man." R. S.

WEST GODOLPHIN MINE.

SIR,—Being in the neighbourhood of this mine I could not resist the desire to get a view of it, and I was exceedingly pleased with what I saw, especially so with the large rocks of rich tinstone that were then drawn out of the mine, and there cannot, I think from the indications, be any doubt that it will in a little time prove what has been predicted of it—a thorough good paying mine, and with a little rise in the price of tin would very soon see the commencement. I would also name that the cutting of the Wilson's lode at the 80 is looked for with much interest by the miners of the neighbourhood, as it is now getting near about the depth where the large and rich deposits of tin have been met with in the district.

RAMBLER.

LEAD MINING IN FLINTSHIRE.

SIR,—After readiag the letters in last week's Journal on the above subject I thought of paying a visit to the district; and I found the mines mentioned by the different writers answer to their reports. The Nanerch Mine is looking very promising, and likely to be a profitable one. In crossing the mountain towards the Prince Patrick Mine a man told me of a fresh discovery at the Old Grosvenor Mine, and he showed me the mine; then I went back towards it, and by enquiring of the men working there they told me all about the discovery, and showed me a specimen of about 50 lbs. of pure galena. From what I saw this mine will be one of the best in the district, I wish the owners every success with it, and hope it will be as profitable as the adjoining mine, Pant-y-Go, which produced a clear yearly income of 180,000*l.* for upwards of 20 years.

Sept. 26. ONE INTERESTED.

PANT-Y-MWYN LEAD MINE.

SIR,—Having observed some remarks in the Journal in reference to my report on the above mine, I am boldly open to meet any disinterested mining engineer of practical knowledge and experience, and go underground with him, when he can see for himself, as I have. I need not recapitulate what I have stated about the enormous wealth of this young mine, which cannot fail to pay large and increasing dividends for at least another generation. I have had upwards of 40 years experience as a practical miner, having worked at Devon Great Consols, Lady Bertha, Sortridge Consols, Whitchurch, East Wheal Russell, Treweatha (lead), and several others; but never have I inspected a more valuable property than the above, with the exception of the Devon Great Consols Copper Mine in the days of its great prosperity. JOHN METHERELL.

Hackney, Sept. 27.

A NEW INDUSTRY FOR CORNWALL.

The West of England Compressed Peat Company made an important movement on Monday, no less than the cutting of the first sod of the railway which is to bring their slice of the moor within reasonable reach, and over which, when constructed, they hope to carry countless tons of that fuel which they hope is destined to effect a revolution in our system of generating heat. It is claimed that there are lying waste on Dartmoor thousands of acres of an article equal to coal in every virtue, and eclipsed by it only in price. The company has been formed for the purpose of working the enormous beds by means of a process of which Mr. John Howard is the inventor. The projected line will cost 6000*l.*, it being possible to economically evade the few engineering difficulties that present themselves. During the proceedings Capt. Peacock, R.N., referred to the fact that at present steam was of the utmost value in the Navy, and he hoped the inauguration of this railway would enable them to produce a fuel for our men-of-war nearly, if not quite, equal to coal. At present coal was supplied to the Navy at 1*l.* per ton; and if it were possible to produce peat at the rate of 12s. per ton there would then be a most important saving effected in the Navy Estimates. The Mayor of Exeter (Mr. H. D. Thomas) acknowledged the compliment in a few genial remarks.—Dr. Woodman said that in these beds was a vein of wealth, the value of which had suddenly been understood, and just at a time when many other things which were the industries of the inhabitants were on the wane. It was a most providential circumstance, and all the more so inasmuch as this wealth was on the surface, and required no labour to dig it. It was as much compressed by nature as it could be by art. It was light, easy of stowage, and contained a large amount of valuable matter. It consisted chiefly of hydro-carbon, and it would be a means, he hoped, of bringing much prosperity to the county. (Cheers.) With the assistance of the railway he was quite sure the mode of transit would be rendered easy, and when they remembered the enormous price of charcoal and the rate at which this could be obtained he was quite certain that carbon would be brought within cheap access of all who desired to consume it. (Cheers.) He believed that a market for it would be found in Paris, to which it would be transported in shiploads. When he heard of the numerous purposes to which carbon could be applied he had never, from his youth upwards, ceased to wonder at its virtues, whether it was in the form of diamonds, gunpowder, or fire. Here they had what was better than a diamond mine—they had a Golconda. (Cheers.)—Alderman Head was confident that the success of the company depended only on the construction of the railway, and that a railway would be proceeded with he had no doubt. It was difficult to estimate the pecuniary value of the peat beds. There were 20,000 acres of them on the moor, and their railway would be simply touching the fringe. There need in this matter be no fear entertained of the effect of competition, for the field was so wide, and the demand would be so great, that a hundered companies could work together and do each other no harm. Peat had been tested for the purpose of working steam machinery, and it had been found that not only would it produce weight for weight the same amount of steam, but that it would promote it more speedily than coal and leave no clinkers to clog. With regard to its advantages in a sanitary point of view they were undoubted, and as an element in agricultural work it was of great service. As a maker of charcoal it would be most popular, and already the company had received orders to supply it to the Government contractors at Woolwich.—Mr. Howard, the engineer, expressed his gratitude to find that after years of labour he was permitted to see begun the work on which he set his heart. Whatever he could do for the benefit of the public and in the advancement of science would not be wanting.—*Western Daily Mercury.*

Meetings of Public Companies.

WEST CHIVERTON MINING COMPANY.

A four-monthly meeting of adventurers was held at the mine on Friday, the 20th inst.,—Mr. THOMAS SMITH (of York) presiding.

The accounts showed labour costs for 20 weeks to be 5963*l.* 3s. 6d.; merchants' bills, 2265*l.* 17s. 1d.; rates and taxes, 124*l.* 11s. 8d.; lord's dues, 242*l.* 2s. 2d.; Vice-Warden's assessment, bankers' commission, 76*l.*; rents, 24*l.* 11s. 8d.; discount allowed for cash payments, 42*l.* 13s. 3d., which, with some other sundries, made the total costs 8792*l.* 13s. 9d. On the credit side there was for lead and blende ores sold, or for sale, 7551*l.* 2s. 1d.; coals supplied to East Chiverton, 164*l.* 4s. 10d.; by credit balance from last account, 1160*l.*: leaving a balance in favour of the adventurers of 83*l.* There were only 16 weeks' sales credited against 20 weeks' costs.

Mr. SMITH, the chairman of the committee, stated that although they did not meet under as favourable circumstances as they had been accustomed to, still they were pleased to find that the meeting had fallen due in its regular turn on the mine (two of the three meetings a year are held in London), so that they might by inspection and personal enquiries be better able to form a correct value and estimate of the position—present and future prospects of the mine. They were sorry the promises of the early spring had not been realised; this they attributed to causes over which they had no control. Since the last meeting in London there had been a continued decrease in the value of their minerals—lead and blende. The markets at that time had every appearance of recovering from the great depression under which they were then labouring. The committee were sorry those anticipations had not been realised, but, on the contrary, the prices were the worst they had known. The committee and manager had had a very anxious time, and seeing no prospect of an early advance in the price of mineral, had endeavoured by the strictest economy in every department to reduce the cost in working, and to meet the loss through the price of mineral. Every credit was due to the workpeople and agents for the honourable manner and spirit in which they had met them, and submitted to reduction of wages and salaries where necessary. They, however, hoped in the end that the very hard times they were then experiencing might be turned to a profitable account, and prove a starting point of advantage whenever an advance in market value of minerals occurred. There were then ready for market several large parcels of blende, valued at from 400*l.* to 500*l.*, the costs of which had been paid, and they could have made those parcels of blende much larger, but they did not consider that it would have been to the interest of the mine or adventurers to make large returns of mineral merely for the sake of making returns. The additional blowers to all the furnaces for the use of anthracite coal had not yet been completed, but they had not the least doubt that when that improvement was carried out there would be a great saving in the coal department.

The agents reported as follows:—Batters' Engine-shaft: Since the last meeting of shareholders this shaft has been completed to the 170, and we have set the shaftmen a bargain to cut a plat, bring down the skip-road, and fix footway, &c., for 50*l.* In the 160, west of Batters' shaft, on south lode, the lode is 2½ ft. wide, producing occasional stones of lead ore.—North Lode: In the 160, west of cross cut, the lode is 4 ft. wide, worth for lead and blende 6*l.* per fm. The lode in the 180, east of cross cut, is fully 4 ft. wide, worth for lead and blende 8*l.* per fm. In the 130, east of Batters' shaft, the lode is 3½ ft. wide, and worth for lead and blende 10*l.* per fathom. We have driven the 150, east of Batters' shaft, on south lode, to within about 15 fms. of Hawke's shaft and 7 fms. in advance of the present end; we have sunk a winze below the 140 down 6 fms., where the lode is 3 ft. wide, and worth for lead and blende 10*l.* per fm.—Hawke's Engine-shaft: In the 140, east of shaft, the lode is 3 ft. wide, and worth for lead 10*l.* per fm. In the 140, west of shaft, the lode is 4 ft. wide, and worth for lead and blende 8*l.* per fm. The breakages to our main rods and pitwork at Batters' engine-shaft have caused the water to rise above the 160, and prevented our working the best stopes in that level for nearly two month; this has seriously interfered with our returns of minerals. As a matter of course, as depth is obtained greater weight is thrown on the pumping machinery; therefore, in order to equalise the weight, and considerably relieve the strain on the rods, we shall, as soon as the sumpmen have completed their bargain at the 170, put in a new balance rod at or about the 110, which we have no doubt will prevent these breakages for the future. We shall then resume the sinking of the shaft for the 180.—Messrs. John Hocking and Son, the engineers of the mine, stated that there was nothing in the engineering department calling for any particular notice. Since the last meeting two undergrate blowers had been set to work, one to Hawke's engine and the second to the new crusher. They were successful in raising steam, but they could not speak as to results, as they had been using different sorts of coals, but not the anthracite, for which they were specially intended. The experiments they had been making to prevent the destructive action of the feed water in the boilers, they were pleased to state, had been successful to a great extent.

The CHAIRMAN proposed, and Capt. SOUTHEY seconded, that the accounts for the 20 weeks ending July 13, showing a credit balance of 80*l.* 13s. 2d., be received and adopted. This was carried unanimously. The agents' report was also received and adopted, and a vote of thanks to the Chairman terminated the proceedings.

EAST CHIVERTON MINING COMPANY.

A four-monthly meeting of shareholders was held at the West Chiverton Mine account-house on Friday, the 20th inst.,

Mr. THOMAS SMITH (of York) in the chair.

The prospects of the mine are exceedingly good, as will be seen by a perusal of Capt. Southey's report. In the 74, driving west, there is a very considerable improvement in the lode, such as to warrant the shareholders' expectations that the mine will shortly turn out a very valuable property.

The financial statement showed labour costs for 20 weeks ending Aug. 10 to be 693*l.* 11s. 10d.; merchants' bills, 205*l.* 7s. 7d.; bank charges, interest, and commission to June 29, 13*l.* 13s.; balance from last account, 503*l.* 5s. 10d.; total, 1415*l.* 18s. 3d. On the credit side there was, by a call of 5s. per share, of 3994 shares, made May 16, 998*l.* 10s.; less discount allowed, 33*l.* 6s. 9d.; balance against the adventurers, 450*l.* 15s., showing a loss of about 53*l.* on the 20 weeks' working. The following is the agent's report:—

In the 64 cross-cut, driving south, the ground is very hard and spare, hence the delay in cutting the (south) lode; this end is being driven by four men, at 1*l.* per fm. I (Capt. Southey) fully expected we should have intersected the lode before the present meeting, but the ground has proved harder in driving south than it did in sinking the shaft. We are forcing the drivage in this direction as fast as possible, fully believing when the intersection is made we shall be well rewarded for the outlay, as the same lode in the mine immediately to our west has been very productive. In the 74, driving west, a good lode of silver-lead ore has been met with and opened on about 8 fms. in length. The end at the last general meeting was producing only occasional stones of lead, which has since improved to 1½ ton of lead ore per fathom, surpassing anything yet seen in the mine, and warrants the sinking of the engine-shaft to a deeper level; this I now strongly recommend doing forthwith, and in order to carry it out effectually our pitwork should be enlarged. We have now in use 11-in. pumps; these, no doubt, could be exchanged for 15 in. by paying the difference in price, which would not be very much. Our engine is powerful enough, but the pumps are too small for a deeper level—in fact, they are not capable of keeping the mine clear of water in a very wet season; last winter we had great difficulty to keep the mine free from water, and the deeper we get, and the more our levels are extended, as a natural consequence the greater is the influx of water against which we have to contend. Therefore, to prevent any flooding it will be advisable to change the pitwork before the winter months set in. It was suggested at our last meeting that the shaft should be sunk another 10 fms., but I did not at that time feel justified in recommending the suggestions being acted upon. But as our prospects have so very much improved at the 74 west, I consider now that no time should be lost in getting the shaft down to the 84; this deepening of the mine will increase our costs not more than 300*l.* for the ensuing four months, to meet which an extra 1s. 6d. per share only will be requisite in addition to the ordinary requirements.

The statement of accounts and agent's report were received and adopted.

The CHAIRMAN said the report was very satisfactory, and would, he thought, be encouraging to distant shareholders. There was no doubt but that they had the commencement of a very good mine, and, from the rich ore seen that day, all who were judges of mineral would agree that there never was such an encouragement held out to them since the time when West Chiverton was in a similar position. He would propose that the necessary means be afforded Capt. Southey for carrying out the suggestions mentioned in his report, to which the other shareholders assented. He would also propose that a call of 5s. 6d. per share be made, payable 5s. per share on or by Oct. 18, subject to a discount of 3 per cent. for prompt payment, and the remaining 1s. 6d. be paid by Dec. 1., also subject to 5 per cent. discount.

Mr. GRANVILLE SHARP (the secretary) in seconding the Chairman's proposition remarked that he believed they were justified in making that call. Undoubtedly the mine was in such a position as it had never been in before. He had been in the habit of visiting the mine for some years past, but he had never seen anything approaching what they had at the present time. He considered they were doing the right thing, and studying the interest of one and all interested in adopting Capt. Southey's report, and making a call in accordance therewith, feeling

fully assured that the shareholders were now to be very soon richly rewarded for their praiseworthy perseverance.

The proposition was carried unanimously, and a vote of thanks to the Chairman terminated the meeting.—*Western Daily Mercury.*

NATIVE GUANO COMPANY.

A general meeting of shareholders was held at the Cannon-street Hotel, on Monday.—Prof. CROOKES, F.R.S., in the chair.

The report stated that a large and ready sale at 3*l.* 10s. per ton had been found for all the guano made at Aylesbury throughout the past season. Neighbouring farmers had repeated their orders, and a large demand had sprung up in Italy and France, where the guano had exercised a beneficial effect in destroying the terrible scourge of the French vines—the phylloxera.

The CHAIRMAN, in moving the adoption of the report, said that the affairs of the company did not look—to a superficial observer—very promising, but to those who had watched, as he had, the progress of sewage precipitation, and knew the state of the public mind, the affairs of the company were never in a more healthy condition. The shares were worth more in the market than before, and the works at Aylesbury were simply perfection. Important deputations frequently visited the works; some of them were composed of Members of Parliament, and several Government officials had also expressed themselves gratified and astonished at the success which chemical precipitation had achieved. The prejudice of the local Government board against this process, he believed, had been completely removed, and their business was now being carried on at a profit. The company had large orders on hand from the Continent, and there was a prospect of still larger orders being received, all of which they saw their way to execute. Shareholders would see by the report that the board had secured a new patent for the production of cheap and effective salt of alumina, which would cheapen the process of treating sewage. This was, in his opinion, by far the most important patent the company had ever possessed, and it was for the shareholders to decide whether this company should work it or a new company be formed for that purpose. It had been considered that the finances were not in a condition to warrant them in taking up this patent, but if a new company were determined on it might be so constructed as to enable the Native Guano Company to hold a large number of fully paid up shares. He moved that the report be received and adopted.—Mr. RAWSON seconded the motion, which, after some discussion, was carried unanimously. A long conversation took place with reference to the working of the new patent, and ultimately a committee of shareholders was appointed to confer with the directors upon the subject, and report to the meeting, which stood adjourned till Oct. 24.

NEW BATTLE MOUNTAIN MINING COMPANY OF NEVADA, U.S.—The statutory meeting of this company, in compliance with the requirements of the Companies Act, 1867, was held on Saturday, at the secretary's office, Liverpool (Mr. Charles Langton in the chair). The business was merely formal, Messrs. J. Bibby, jun., G. Chamberlain, J. Hallows, C. Langton, and Thos. Whitney being elected directors, and Mr. J. M. Wade was elected auditor of the company.

COMBMARTIN.—At a general meeting of adventurers, held on Wednesday (Mr. F. Thomas in the chair), the accounts showed a balance of assets over liabilities of 10*l.* 10s. 11d. The agents reported that in the 15 fm. level driving east the lode is 5 ft. wide, producing a little lead and blende, and has a very promising appearance. The end is now about 8 fms. behind the point from which some good lead has been broken from the lode at surface, and when this point is reached an improved lode is expected. The adit cross-cut, which is being driven to intersect several lodes in the western part of the mine, has been driven 59 fms. During the past three months a caunter lode has been intersected, which is being opened upon south-east and north-west. In the former place the lode is 4 ft. wide, and of very encouraging features. The agents say they shall not be surprised if a good bunch of lead is met with any day. In the north-west end the lode is 4 ft. wide, carrying a little lead and blende. The main lode, which in the former working produced large quantities of silver-lead, is about 45 fathoms beyond the present adit cross-cut end, but before it is reached two or three other lodes will be intersected, and one of which the agents think is not far off, as the ground is highly mineralised. The agents consider the prospects of the mine very encouraging, and think the prosecution of the present operations will be attended by good results, and at a monthly cost of about 65*l.*

THE SCOTCH MINING SHARE MARKET—WEEKLY REPORT AND LIST OF PRICES.

Since last report (Sept. 12) the markets have remained extremely dull and otherwise featureless. The usual fortnightly settlement has come round again this week, and the business to be arranged has been found very limited. The dealings are now for next settlement (Oct. 16), and cannot be reported any brisker. The opening of next month will, no doubt, show whether the past two months' dulness has been the commencement of a settled depression which will spread over the winter, and, with an Indian war, well into next year, or simply a temporary lull as a natural reaction from the slight improvement in business activity that ensued from the satisfactory termination of the Congress at Berlin.

In shares of iron and coal concerns the principal alteration is a decline of 2*l.* per share in Ebbw Vale, owing to the lamentable explosion at the Abercarne Colliery of this company. Omoa and Cleland are 3s. and Monkland 2s. 6d. both lower also. The other quotations show no noteworthy alteration, and are fairly supported, as investors appear to have more confidence in this than any other branch of mineral enterprise. The sales of coal of the Scottish Australian for July have been 17,332 tons. Andrew Knowles and Sons are at 5 dis. Bolckow, Vaughan, A, 58¾ to ⅝; ditto B, 37½; and ditto 5 per cent. (pref.), 19¾; C. Cammell and Co., 5 to 4½ dis.; Ebbw Vale, 6½ to 7; John Brown and Co., 10½ dis.; Nant-y Glo and Blaina (pref.), 23 to 25; Scottish Australian, 36s. 3d. to 38s. 9d. Sheepbridge, 28 dis.; Staveley, A, 11 to 13 prem.; Thorp's Gawber Hall, 40s.; West Mostyn (pref.), 20s.; Wigan, 72.

In shares of foreign copper and lead companies Cape are 10s. higher, and this company's last sale of 500 tons averaged 11s. 11½d. per unit. The reports from the Yorke Peninsula continue very satisfactory. The ore on hand on July 31 was 275 tons of 7 per cent., and 760 tons dredge ore of 5 per cent. A shipment was being made of 100 tons of 20 per cent. Alamillos are at 22s. 6d. to 27s. 6d. Linares, 85s. New Quebrada, 32s. 6d. Rio Tinto 5 per cent., 62. Yorke Peninsula, 3s. 9d. to 5s; and ditto (pref.), 15s. to 20s.

Shares of home mines are completely out of favour owing to the hopeless condition of the copper and lead markets at present. St. Patrick shares have been offered as low as 10s., while if they cut a good lode at the place where they are now working close up to expecting to do so the shares might be worth 4*l.* There has been some slight demand for tin shares, but no rise has resulted of much importance. South Condurrow continue to be thought good, and it is satisfactory to know Medlyn Moor is likely to do a little better by-and-bye. Perhaps the best of all, however, is South Frances, which was stated at last meeting to be making 25 per cent. profit on the returns. If they can do so with tin at 34*l.* per ton it is evident the shares will have a heavy rise if tin improves a little. Bampfylde are at 5s. Bodidris, 20s. 6d. Cambrian, 3. Combmartin, 5s. Devon Consols, 2. D'Eresby Mountain, 70. Glenroy, 10s. Leadhills, 40s. to 45s. Melindur Valley, 20s. North Laxey, 2s. 6d. Parys Mountain, 4s. 6d. to 5s. 6d. Pateley Bridge, 75s. Pennant, 90s. Prince of Wales, 1s. Rookhope, 13s. 9d. Tankerville, 70s. West Godolphin, 7s.

In shares of gold and silver mines Richmonds have improved 32s. 6d. per share, and there is some demand for the cheaper shares, such as Antioquia, Pitangui, &c. The profit at Almada for July was $400. The produce of St. John del Rey for August has been 35,000 ozs., and for the first division of September 8250 ozs.: the supply of water continues short at these mines. The Port Phillip Company announces a profit of 989*l.* on the month ended Sept. 11. Birdseye Creek are at 12s. to 15s.; Colorado, 72s. 6d.; Eberhardt, 90s.; Emma, 2s.; Exchequer, 1s. 6d.; Flagstaff, 10s.; Frontino, 55s.; Gold Run, 5s. 6d.; I.X.L., 1s. 6d.; Javali, 8s.; New Zealand Kapanga, 31s. 3d.; Port Phillip, 10s. to 11s.; Santa Barbara, 24s. to 25s.; South Aurora, 2s. 6d. to 3s.; Tecoma, 3s.; United Mexican, 75s.

In shares of oil companies the only movements are a rise of 5s. on Dalmeney and a fall of 6d. on Oakbank (new). The report of Price's Patent Candle Company for the six months ended June 30 last shows that after paying the dividend on the preference shares a balance of 10,669*l.* will remain to be carried forward. The balance brought into the account was 5838*l.*, and the manufacturing profit was 7916. After several deductions the amount available for distribution was 11,715*l.*

Shares of miscellaneous companies have been very quiet. London and Glasgow Engineering and Iron Shipbuilding shares are now quoted ex div. Phospho-Guano have advanced 5s. per share, and the Scottish Wagon (new) are 6d. lower. Palmer's Shipbuilding Company has recommended a dividend of 3 per cent. per annum, and B shares are higher at 12 dis. Milner's Safe are at 9. New Sombrero Phosphate, 11. The Native Guano Company meeting adjourned to Oct. 24 to receive a report on the working of a new patent for the production of a cheap and effective salt of alumina. It was stated they had large orders on hand from the Continent, were expecting to get more, and saw their way to execute all of them. The company's position appears to have greatly improved, and they have now got the works at Aylesbury into grand working order. The only transactions in chemical companies' shares have been Lawe's at 8½ and Langdale's 4¾, both ex div.

On Contango-day (Tuesday) the following were the rates of continuation current:—Contangos: 9d. on Benhar Coal; 1½d. on Glasgow Caradon; 1½d. on Glasgow Port Washington; 1½d. on Huntington; 9d. on Richmond.—Backwardations: 1s., 1s. 3d., 1s. 6d. on Tharsis; 6d. on Uphall; 3d. even, 1½d. even on Young's Paraffin. On comparing the making-up prices fixed to day for the following shares with those of the previous settlement the movements thus shown for the account are—Richmond, 10s. per share; and Tharsis, 7s. 6d. Omoa and Cleland have fallen 2s. 9d. Benhar and Monkland each 2s. 6d.; Young's Paraffin, 1s. 3d.; and Huntington, 6d. The following show no alteration:—Canadian Copper, Glasgow Caradon, Glasgow Port Washington, Marbella, Oakbank Oil, Tharsis (new), and Uphall Oil.

LEAD ERA MINING COMPANY (Limited).—A company has just been formed under this title to work a property situated in the parish of Llandigla, Flintshire. The great profits the mines in North Wales have yielded are so well known that the importance of this undertaking will be seen from their having an area of 200 acres in the midst of this rich mineral district, and in the same favourable rock formation. There are five distinct champion lode intersecting the flats which underlie the surface. Reports have been obtained on the property from eminent authorities, from which it appears the prospects are far above the average standard, and the chances favourable for early discoveries. The capital is 12,500*l.*, in 1*l.* 10s. shares.

PEARSON AND KNOWLES COAL AND IRON COMPANY (Limited).—The report to the fifth annual meeting of this company states that the condition and prospects of trade are not such as to warrant the directors paying a dividend, although they have sufficient funds, including the balance brought forward, to do so on the A shares. The profit for the year was 10,824*l.*, and the amount taken from profits to add to plant now amounts to in all 49,701*l.* This is, of course, a safe investment, but it is to be hoped the expenditure on this account has now about finished, as the company's shares are fully paid up, and it might be awkward to meet further calls for fresh capital.

NEW LEAD COMPANY.—A company will be shortly introduced which is now quietly working on a lead sett in Cardiganshire adjoining to and parallel with the Lisburne mines on the south. The mine is provided with a steam-engine, water-wheel, dressing-floors, smithy, and carpenters' shop. There are two winzes at the bottom of the 23, which is the deepest. The ore is worth 1 to 1¼ ton per fathom. About 1000*l.* worth of lead and blende has been sold while sinking this shaft, and adjacent thereto. They now propose to sink another 10 fms. to get at and under the deposit. The prospects are undoubtedly good, as besides the Lisburne Mines on the south, which have paid 230,000*l.* in dividends, the sett is surrounded by other rich mines on the north. The capital is in 15,000 shares of 1*l.* each.

There are several mining properties at present being formed into public companies which appear likely to do very well, and particulars of which are expected to be ready very soon, when they will be referred to more fully. The principal property contains manganese, copper, and lead. Another is a good clay sett, only about two miles from Plymouth. There is also a granite quarry and a slate one. These last two are likely to prove very successful, the former being in a very highly mineralised stratification, and the latter possessing exceptional facilities for transport. There is also a fine mining sett close to the D'Eresby Mountain Mine, containing all the lodes of the latter mine, which have been worked close up to the boundary. It is considered one of the most valuable mines in the district, as it lies between Aberlyn and the D'Eresby Consols. The area is over 68 acres. On comparing the price for which this property could be obtained with what the promoters of other mines in the immediate neighbourhood have placed upon them, the conclusion is that not only as one of the best setts offered in the district it is by far the cheapest, but also that the promoters of these other mines must be people who want to make a fortune in too great a hurry.

Subjoined are this week's quotations, &c., of mining and metal shares quoted on the Scotch Stock Exchanges:—

Capital. Per share.	Paid up.	Dividends. Rate per cent. per annum. Previous.	Last.	Description of shares.	Last price.
				COAL, IRON, STEEL.	
£ 10	£8	£ 7	£ 7†	Arniston Coal (Limited)	7¼
10	10	4	4	Benhar Coal (Limited)	6
100	50	22s6d‖	3s6d‖	Bolckow, Vaughan, and Co. (Lim.)	A. 59¼
10	10	10	10	Cairntable Gas Coal (Limited)	8
10	10	4s‖April,	1876	Chillington Iron (Limited)	70s.
10	7	—	—	Clyde Coal (Limited)	7
25	20	10s‖Dec.,	1874	Ebbw Vale Steel, Iron, and Coal (Lim.)	6¾
10	6	nil	nil	Fife Coal (Limited)	70s.
10	10	nil	nil	Glasgow Port Washington Iron & Coal (L)	47s. 6d.
10	10	—	—	Ditto Prepaid	47s. 6d.
10	10	—	—	Lochore and Capledrae (Limited)	80s.
10	10	nil	3	Marbella Iron Ore (Limited)	60s.
10	10	nil	nil	Monkland Iron and Coal (Limited)	45s.
10	10	5	4	Ditto Guaranteed Preference	60s.
100	100	nil	nil	Nant-y-Glo & Blaina Ironworks pref. (L)	25
6	6	nil	nil	Omoa and Cleland Iron & Coal (L. & Red.)	7s.
1	1	15	15	Scottish Australian Mining (Limited)	37s. 6d.
1	10s.	15	15	Ditto New	15s.
Stock	100	nil	nil	Shotts Iron	91
				COPPER, SULPHUR, TIN.	
4	4	—	—	Canadian Copper and Sulphur (Lim.)	5s.
10	7	7s 6d‖	35s‖*	Cape Copper (Limited)	30½
1	1	7½	2¼	Glasgow Caradon Copper Mining (Lim.)	20s.
1	15s.	7½	2½	Ditto New	13s. 6d.
10	9¾	nil	nil	Huntington Copper and Sulphur (Lim.)	27s.
4	4	—	—	Panulcillo Copper (Limited)	20s.
10	10	6†	6†	Rio Tinto (Limited)	67s. 6d.
20	20	7	7	Ditto, 7 per cent. Mortgage Bonds	14½
100	100	5	5	Do. 5 p.ct. Mor. Deb. (Sp. Con. Bds.)	6½
10	10	22½	20	Tharsis Copper and Sulphur (Limited)	23¾
10	7	22½	20	Ditto New	16¾
1	1	—	—	Yorke Peninsula Mining (Limited)	5s.
1	1	—	—	Ditto, 15 per cent. Guaranteed Pref.	20s.
				GOLD, SILVER.	
1	1	—	—	Australian Mines Investment (Limited)	8s.
5	5	7s. 6d‖	7s. 6d‖	Richmond Mining (Limited)	10½
				OIL.	
10	7	6	15	Dalmeny Oil (Limited)	8¾
1	1	7½	25	Oakbank Oil (Limited)	41s. 6d.
1	5s.	—	25	Ditto	11s.
10	10	7½	2	Uphall Mineral Oil (Limited) "A"	8¾
10	10	—	—	Ditto "B" Deferred	10
10	10	—	—	West Calder Oil (Limited)	15s.
10	8¾	17½	17½	Young's Paraffin Light & Mineral Oil (L).	14½
				MISCELLANEOUS.	
50	25	5	6	London and Glasgow Engineering & Iron Shipbuilding (Limited)	22½
7	7	15	10	Phospho Guano (Limited)	9¼
10	10	6	6	Scottish Wagon (Limited)	10¾
10	4	6	6	Ditto New	8½. 6d.

† Interim. ‖ Per share. * For six months of 1878.

NOTE.—The above lists of mines and auxiliary associations are as full as can be ascertained, Scotch companies only being inserted, or those in which Scotch investors are interested. In the event of any being omitted, and parties desiring a quotation for them and such information as can be ascertained from time to time to be inserted in these lists, they will be good enough to communicate the name of the company, with any other particulars as full as possible.

J. GRANT MACLEAN, Stock and Share Broker.

Post Office Buildings, Stirling, September 26.

FOREIGN MINING AND METALLURGY.

The Administration of the French State Railways has let to the Denain Company a contract for 12,000 tons of steel rails at 8*l.* 5s. 9d. to 9*l.* per ton, according to the place appointed for delivery. These terms are very low, and exhibit an important reduction as compared with previously concluded contracts. The Administration of the French State Railways also recently invited some of the leading French mechanical firms—the Creusot Works, the Fives-Lille Company, MM. Claparède and Co., MM. Cail and Co., MM. Goain and Co., and the Alsatian Company of Graffenstaden—to tender for 25 locomotives required for the system. The maximum price fixed by the Administration was 1704*l.* per passenger engine and 1580*l.* per goods engine, with 320*l.* additional for each tender. As the offers submitted exceeded these maximum terms no contracts were let, but it is understood that a new adjudication will shortly take place, and that contracts will then be let for 50 locomotives instead of 25.

It appears from an official return that the total exportation of metals from Sweden in 1877 amounted to 50,416 tons, against 42,841 tons in 1876. The exportation of iron in bars comprised 30,020 tons in 1877, as compared with 25,809 tons in 1876. There was a further decline of about 6s. 9d. per ton in some descriptions of wrought iron in the autumn of last year. In the present season the current rates have been those of last autumn. The exportation of pig-iron from Sweden last year amounted to 10,484 tons, showing an increase of 1655 tons as compared with 1876. The price ranged last year from 4*l.* 6s. 6d. to 4*l.* 2s. 6d. per ton; the last-named price is that now current. The exports of steel from Sweden last year comprised 1038 tons; the average price last year was 13*l.* 18s. 4d. per ton, it is now 13*l.* 4s. per ton.

The intelligence received from the Belgian coal mining centres exhibits greater activity in the deliveries; this is due to the orders received from the sugar works, which are about to commence their operations. The increased activity has not brought with it, however, any improvement in prices, which remain, on the contrary, feeble. The glass trade has somewhat improved, and this may exert a good influence. Coal for domestic purposes begins to be sought after, but too much importance must not be attached to this circumstance, which is, of course, usually observed at this period of the year. Coal freights from Mons to Paris have been fixed at 5s. 9d. per ton; upon these terms all the available boats have been immediately chartered; it was time this should be the case, as stocks of some little importance had begun to accumulate, while the movement of beetroot will probably shortly reduce the supply of railway rolling stock which would be otherwise available for the conveyance of coal.

At the last meeting of the Industrial Bourse of Brussels a little more animation was remarked in the iron trade, and a fair number of transactions were concluded in plates, sheets, &c. There were also some orders given out for machinery and trucks, but the prices at which these orders were let were very low. Some foreign orders were noted, Turkey being among the countries from which such orders were forthcoming. An application has been made to the Belgian Minister of Public Works that scrap iron may have the benefit of the special exportation tariff No. 3 applied to rails and accessories. The Monceau-sur-Sambre Blast Furnaces Company has just held its meeting for the year ending June 30, 1878. The company was shown to have realised during the past year a profit upon its capital at the rate of 15¾ per cent. per annum.

MODERN STEAM, AIR, AND GAS ENGINES.

In connection with the literature of the steam-engine there is, probably, no name better known nor more highly respected than that of Mr. JOHN BOURNE, all of whose books are not only very instructive but thoroughly practical. He has now completed a handsome and useful volume on Modern Steam, Air, and Gas Engines,* in which the information is brought down to the latest date. The earlier portion of the work was written previous to 1870, when Mr. Bourne intimated that he was desirous of embodying in it some new information which he could not at that moment communicate, and the publication was suspended to enable the addition to be made. He was at that time engaged in a series of elaborate experiments to determine in what way coal dust could best be utilised in the generation of motive power, and these experiments took a much longer time than was anticipated; the delay, however, he believes will not be without its compensations. A clearer insight has, meanwhile, been obtained touching the laws which must finally determine the forms of thermo-dynamic apparatus; and the course which impending improvement must follow has also become more conspicuous and indelible. His own experiments with coal dust show that the benefits formerly expected by himself and others from the use of powdered fuel are illusory, for although he finally succeeded in burning powdered fuel without sparks, and without difficulty from clinker, yet the ultimate conclusion was that the refuse fuel as it comes from the mine could be burnt with equal or greater facility, and with an equal or superior calorific effect. Bituminous coal reduced to a very impalpable powder by means of millstones is easily burnt; but such coal dust is far too costly for common use. If the coal be more coarsely powdered by crushing it between rollers he found great difficulty to burn it completely. If projected over or through a common fire the larger part of such dust passed off as incandescent sparks, and when an arrangement of furnace was perfected whereby these sparks were retained and subjected again and again to a blast of air until they were finally consumed, the incombustible parts of the coal gradually formed a pasty mass of clinker, by which the action of the furnace was obstructed. Under the arrangements finally employed a liquid clinker was produced which ran out of the furnace, and the mechanical difficulties which stood in the way of the perfect combustion of the dust were surmounted, but it was then found that the coal could have been utilised more simply and quite as efficiently if it had been burnt in the usual way without being reduced to the form of dust at all. Mr. Bourne's original expectation had been that by reason of the minute subdivision of the fuel its combustion would have been almost instantaneous, whereby the furnace might have been reduced to small dimensions; but unless the coal were of the bituminous kind and were powdered very fine this anticipation did not prove correct. As the dust, except when it first entered the furnace, was suspended in an atmosphere of carbonic acid or carbonic oxide gas the solvent action was much slower than in the case of fuel on the bars of a grate which continually encounters a fresh current of air, whereas in the case of dust travelling with the current there is no relative motion between them. On the whole, the burning of the dust was found to be a difficult operation to accomplish, and when accomplished it was further found that the pulverisation could be dispensed with without detriment to the result.

And just as Mr. Bourne has been able by actual experiment to explode the fallacy of the declaration that economy results from burning coal in powder, so he shows that, unless in exceptional cases, steam cannot be advantageously replaced in a motor engine by either air or gas. He states that notwithstanding the vast number of expedients which have been propounded for the transformation of heat into power the steam-engine continues to be the only thermo-dynamic motor yet available for purposes of any importance. A few gas engines by Lenoir, Hugon, Otto and Langen, and others have been introduced for petty uses, their chief recommendation being that they do not require so much attention in working as an engine dependent on a boiler; but even in this respect there will be little difference between the two systems if the boiler be heated by gas, and if a self-acting feed to maintain a uniform level of the water be employed. The size and cost of a gas engine without a boiler are about as great as the size and cost of a steam engine with a boiler, and the steam engine is more equable in its action and less noisy. The thermo-dynamic efficacy of the air or gas engines hitherto introduced is not high, and although in the engines of Hirsch, Fleeming, Jenkin, and others, in which the cylinder is converted into a furnace burning gaseous and liquid fuel, and kept very hot, a high performance ought to be attainable, yet no engine upon that principle has yet been brought into successful operation, and the ends proposed by those engines are probably attainable by simpler means.

High speed and compound engines are prominently referred to by Mr. Bourne. He remarks that it has been found that instead of the speed of engines being limited to the pace employed in the last century they may be run much faster, provided that the momentum of the reciprocating parts be balanced, that the rubbing area of the bearings be increased, and that the other parts be suitably constructed for the higher speed. The advantages of the acceleration are that the motion is more equable, and that the engine is both lighter and cheaper for the generation of a given power, whilst from the enlargement of the rubbing surfaces the wear is no greater than it was before. The compound engine as now made is much more economical in fuel than the simple engine of the old-fashioned type; but it is not so much from the use of the double cylinder arrangement as from the simultaneous employment of steam of a high pressure worked expansively that the reputed economy of the compound system has been derived. Engines of similar size using steam of the same pressure and working with the same measure of expansion will consume the same quantity of fuel in generating any given power whether the engines be on the simple or compound principle, and it is, therefore, rather in the large use of expansion than in the adoption of the compound principle that the secret of modern economy consists.

The earlier chapters of the volume contain a considerable amount of interesting information. The past, present, and future of engines for generating motive power are first dealt with, and there are then chapters on fuel and boilers, pumping, blowing, mill, marine, and locomotive engines. The various projects for motive power are then treated of, and various details of vast utility to practical men are fully discussed; and reference is then made to the various inventions and improvements which for the last few years have attracted attention. An account of Ericcson's caloric engine is followed by a comparison of steam, air, and gas engines. The experiments with coal dust and gas furnaces are recorded, and there are several chapters discussing the details of compound engines, and in the remaining chapters full particulars are given of Bourne's high-pressure high-speed engines; of Cornish, Lancashire, vertical, and other boilers; of Maudslay's compound marine engines; of torpedo boats, modern locomotives and traction engines, steam road-rollers and steam fire-engines; and finally he states that the conclusions at which he has arrived from the investigations rendered necessary by the preparation of the present work may be summed up in a few words. Of the numerous projects which have been propounded for the production of motive power from heat, whether by air, gas, or other agents, there is none which is on the whole so eligible as the steam engine. In steam engines the objection is the boiler, and it has often been proposed to reduce its dimensions by sending the products of combustion into the water direct instead of transmitting the heat through metallic surfaces; but such an arrangement involves the use of a very large pump and of special arrangements to start the engine, and upon a review of all the considerations on

* "Examples of Steam, Air, and Gas Engines of the most recent approved types, as employed in mines, factories, steam navigation, railways, and agriculture practically described, &c." By JOHN BOURNE, C.E.: 54 plates and 356 woodcuts. London: Longmans, Green, & Co.

one side and the other which ought to control the conclusions arrived at, it appears that in the present state of our knowledge the boiler is the lesser evil. Engines deriving their power from the explosion of a mixture of gas and air present the same objections which would attach to a gunpowder engine, of which the principal is that from the severity of the initial strain, and from other causes, the size and weight of the engine require to be very great relatively with the amount of power generated. He considers that gas engines might be improved, but that even then they would continue to be much larger and more costly than steam engines exerting the same power.

The letter-press being accompanied by working drawings the value of the volume is much enhanced, and as Mr. Bourne embodies a critical account of all projects of recent improvement in furnaces, boilers, and engines, practical men will find the book of great practical utility. The work is dedicated to His Excellency Kuo Sung Tao, the Chinese Minister at the Courts of England and France, the first regularly appointed diplomatic agent sent by China to a foreign country; and there can be little doubt that if the contents of the book be made known to the Celestials it is well calculated to create amongst them a high opinion of British engineering science.

Registration of New Companies.

The following joint-stock companies have been duly registered:—

LIFE-SAVING APPLIANCES ASSOCIATION (BY SEA AND LAND) (Limited).—Capital 20,000*l.*, in shares of 1*l.* To manufacture, sell, and lend on hire life-belts, collars, pads, and every other life-saving apparatus and appliances at sea and on river. The subscribers, who take one share each, are—James D. Barker, 26, Budge-row, E.C.; C. Williams, 37, Arundel-street; W. B. Guinee, 7, New Inn; W. Ash, 43, Lincoln's Inn fields; C. Horsley, 2, Staple Inn; W. Thompson, Hatcham Lodge; E. T. Hargreaves, Sythe Rosendale-road, Dulwich.

THE COUNTIES OF DOWN AND ANTRIM TRAMWAYS (Limited).—Capital 50,000*l.*, in shares of 10*l.* To construct, lay down, and maintain tramways in Ireland, and the working and using of the same with carriages, &c., drawn by steam power or horses or other means, the acquisition of lands, tramways, roads, &c., in Ireland. The subscribers are—G. E. Stokes, 64, Dumont-road, 1; J. Parkinson, 188, Great Tower-street, 1; C. J. Lawes, Greenwich, 25; T. Jones, 136, Winston-road, Middlesex, 3; J. S. Houston, 25, Crosby Hall, E.C., 1; J. Wykes, Wanstead, 5; D. P. Jones, 12, Leconfield-road, London, 3.

QUAKERS' YARD, GAS, AND WATER COMPANY (Limited).—Capital 15,000*l.*, in shares of 10*l.* For carrying on the business of a gas company in and about Quakers' Yard, Treharris, Llancaiah, and Bedlinog, in Glamorganshire and elsewhere. The business to include making and selling gas, coke, tar, pitch, &c., and the purchasing, laying down drain pipes, meters, lamps, &c., and carrying on the business of a water company. The subscribers are—J. Perrott, Hengoed Hall, Glamorgan, 10; W. Beddoe, Nelson, 10; W. Rees, Penywann House, Glamorgan, 10; D. Morgan, Pontlottyn, 25; D. E. Jones, Treharris, 2; R. Powell, Talybont, 5; J. Leigh, Llanfabon, 10; P. Whyte, Cardiff, 10; J. Morgan, Cardiff, 10; T. Morgan, Maesteg, 30.

THE NEILGHERRY AND SOUTHERN INDIA LANDS INVESTMENT COMPANY (Limited).—Capital 250,000*l.*, in shares of 10*l.* To make advances upon real and personal estates, merchandise, stocks, produce, or securities of any description in Neilgherry, Southern Indies, Ceylon, and elsewhere. To take possession of and sell, let, or manage estates and property upon which advances have been made by the company. The subscribers are—R. H. Shaw, 9, Fenchurch-street, 100; E. Chambers, Weay Park, Reigate, 100; A. Wedderburn, 14, St. James's-square, 100; J. B. Keith, Beypore, 100; J. Watson, 4, Cullum-street, E.C., 50; J. E. Cowan, 4, Cullum-street, 50; E. B. Livingston, 31, Great St. Helen's, 50.

PATENT GLASS VENEER COMPANY (Limited).—Capital 25,000*l.*, in shares of 5*l.* To purchase from James Budd the Letters Patent for an invention of "improved method of decorating glass to be used as a substitute for veneers." To manufacture and sell the said decorated glass, also panels, furniture, &c., and to acquire any other Letters Patent which have been or may hereafter be granted to James Budd or any other person. The subscribers are—F. C. Knowles, Lovell Hill, 2; J. Tobin, 14, Alexander-square, South Kensington, 2; H. V. Godee, West Croydon, 2; J. Budd, 51, Wentworth-road, 2; J. H. Stephenson, 3, Newman-street, 2; A. McMichael, 207, King's-road, 2; C. Tyler, 45, Commercial-road, 1.

ASHTON AND GREEN (Limited).—Capital 150,000*l.*, in shares of 250*l.* To carry into effect an agreement between Samuel Elkanat Ashton, Cecil Egerton Green, Edmund Ffarington Mathews, and Ernest Mathews, all of 11, 12, 14, and 15, Bury-street, St. Mary Axe, E.C., slate, marble, iron, and general merchants and manufacturers, of the one part, and Richard Dawes, the younger, of Angel-court, Throgmorton-street, solicitor (acting as agent for the company), to acquire the business now carried on by Messrs. Ashton and Green, together with the land and buildings, also the pending benefit of contracts and goodwill of same business. To grant licenses for the use of any patent and rights belonging to the company. The subscribers (who take one share each) are—E. Ashton, Bromley; C. E. Green, 8, Ryder-street, St. James's, London; E. H. Mathews, 142, Harley-street, London; J. Davis, 106, Leman-street, London; A. W. Fulcher, The Terrace, Tunbridge; J. T. Morgan, Brampton Park, Huntingdon; G. M. Morgan, Brampton Park, Huntingdon.

LONDON AND HAMPER COMPANY (Limited).—Capital 5000*l.*, in shares of 2*l.* each. To purchase from Mr. N. Woodward the business hitherto carried on under the style of the London and Hamper Company for the supply of hampers for the carriage of meat and provisions upon the London and South-Western Railway, the carrying on of the business of contractors for hampers, &c., and for the carriage of meat, butter, fruit, game, &c., upon the various railways. The subscribers (who take one share each) are—J. Reader, Aylsbury; J. Seear, 105, Cheapside; F. J. L. Smith, 38, Throgmorton-street; F. H. Bromfield, 52, Cheyne-walk; G. W. Wood, 4, Lombard-court, E.C.; L. W. M'Leod, 120, Chancery-lane; W. Mitchelblardt, 55, Old Broad-street, E.C.

THE ABBOTS BLENDE AND LEAD MINING COMPANY (Limited).—Capital 10,000*l.*, in shares of 2*l.* each. To purchase an agreement entered into between A. J. Gulston and A. S. Gulston of the one part, and R. Rickard of the other part, for the grant of a lease of all ores, metals, and minerals (but not stone) in Glamorganshire, called the Abbots Mine, with machinery, &c., belonging to said mine. The purchase of any other mining property in Wales. The purchase and sale of crushing and smelting manufactures of any other ore or minerals. The subscribers (who take one share each) are—Hyde Knapp, 19, De Beauvoir-crescent, chemist; Frederick H. Vandyke, 70, Rosemary-road, Peckham, accountant; Evan Evans, 50, Old-street, London, mine agent; J. Cann, St. Day, accountant; Joseph Conyer, 53, Westwick Gardens, Shepherd's Bush, gentleman; Fedor Cole, 22, Jefferson-street, Bow, agent; George Chuttro, Duke-street Chambers, commission agent.

THE PONTEFRACT COCOA AND COFFER-HOUSE COMPANY (Limited).—Capital 5500*l.*, in shares of 1*l.* To establish houses, rooms, stalls, &c., in and around Pontefract for the sale of general refreshments other than intoxicating liquors. The subscribers are—J. A. Phillips, Pontefract, 100; J. F. Atkinson, Pontefract, 20; J. J. Christie, Pontefract, 20; J. Hammond, Pontefract, 25; H. Muscroft, Pontefract, 20; E. Potter, Carleton Park, 50; J. Rhodes, Suydale Hall, 100; J. Taylor, Pontefract, 50.

WILLIAM SLACK AND SON (Limited).—Capital 60,000*l.*, in shares of 10*l.* To carry on the business of fellmongers, wool merchants and brokers, manufacturers, and merchants of leather, neat's foot oil, glue, &c., and commission agents. The subscribers are—F. Ward, Sheffield, 50; H. Pawson, Sheffield, 50; M. Scorer, Chesterfield, 50; W. Slack, Chesterfield, 50; C. Portland, Chesterfield, 50; S. Slack, Sheffield, 50; J. Slack, Sheffield, 10.

AUTOMATIC PLAITING MACHINE COMPANY (Limited).—Capital 10,000*l.*, in shares of 5*l.* To manufacture, sell, let, or hire every kind of machinery, to purchase and contract for machines, to dispose of patents, patent rights, lands, buildings, &c. The subscribers (who take one share each) are—C. G. Hill, Nottingham; J. Wightman, Nottingham; O. M. Chamberlain, London; A. Miller, London; J. Lindsay, Edinburgh; J. W. Columbine, 3, Bell-terrace, Acton; J. G. Weir, London.

IMPROVED ROCK DRILLS.

Among the many rock drills which have been offered for the consideration of mining engineers, the later forms of Ingersoll have been acknowledged to possess many advantages, and some additional improvements have recently been patented by Mr. A. H. Elliott, of New York, which it is believed will make the drill as near as may be perfect. The invention embraces a feeding arrangement, but Mr. Elliott has also a device for rotating the piston and feeding the cylinder by hand. The ordinary D-valve is used, but it is made circular, and has at each end a piston turned to fit the valve box, and is provided with a guide to prevent its turning around. The valve box has exhaust ports for the valve pistons, and these ports are carried across and to opposite ends of the valve box, and lead down into the steam cylinder through suitable openings. From this the exhaust is carried into the main exhaust port by a groove or recess turned in the piston, and thence by openings in the side of the cylinder. In the construction of the valve guide a hole is bored through the circular-shaped D-valve lengthwise, and is slotted through for a portion of the way to receive a feather, which is let into the bolt passing through the valve. This bolt answers the several purposes of holding the valve box caps firmly to their places, of keeping the valve in position, and of affording support to the valve, and thus lessening its wear on the valve seat. The valve box is supplied with rubber cushions at each end, which are protected by steel plates, so that the valve strikes against the face of these plates, to which the cushions are clamped, and thus prevents jamming of the rubber and breakage of the valve from concussion.

There is nothing peculiar in the construction of the piston carrying the boring bit; it is a long or double piston with packing rings at each end, but it has a groove or recess turned out in its centre for conducting the exhaust steam or air from the valve pistons into the main exhaust port. The upper end of the piston is bored out to receive a fluted nut and the fluted bar used for rotating the piston. This fluted bar and feed screw are made of one piece of steel. The cylinder is carried up and down by a collar. The screw of the piston passes through a nut fastened to the end of the tripod, and when the screw is revolved by the crank the cylinder is carried up and down as required, and the piston is rotated at the same time. The tripod is adjustable, and particularly so to quarry work, its legs being telescopic, and the back leg hinged so as to give the angle required.

But this is not the only method for advancing the cylinder towards the rock which Mr. Elliott proposes to use, as the rock may be cut away by the drilling bit by an automatic arrangement. A shaft is placed upon the outside of the cylinder, and extends from about its lower end to the top of same. From this shaft a projection or enlargement extends to the inside of the steam cylinder at its lower end. This projection is bevelled, and when the rounded edge of the piston comes in contact with it the projection is forced outward from the inside of the cylinder, and imparts a rotating motion to the shaft, which in its turn operates a feeding device at the top end of the cylinder by disengaging a pawl from a rotary feed nut, which nut advances the cylinder upon a screw in the usual way. When the piston returns upon its upward stroke the projection upon the shaft is relieved from contact with the piston, and a spring does the feeding by forcing the pawl against the teeth of the rotary feed nut, and at the same moment carries the projection back to the inside of the cylinder. It is evident, therefore, that if the rock is cut away sufficiently for the piston to descend against the projection, that in forcing the same outwards the feeding device at the top is regulated thereby.

To operate the machine the air or steam is turned on and the valve is caused to move upwards, which opens the main supply port to the lower end of the cylinder, and at the same time frees the exhaust from the upper end. The piston immediately rises till it closes the exhaust from the upper end of the valve box, and opens the connection for the exhaust to the lower end of the valve box, which then allows the valve to return downwards and supply steam or air to the upper end of the piston, and thus move the piston to the rock. This movement of the piston closes the exhaust from the lower end of the valve box, and opens its upper end, causing the valve to rise and continue the motion.

MANUFACTURE OF SULPHATE OF ALUMINA.

A peculiar process for the manufacture or production from aluminous earths containing more or less iron (such, for example, as clay, kaolin, and the like, and by preference from the hydrates of alumina known as bauxite, containing from 50 to 80 per cent. of alumina), of a neutral sulphate of alumina, free, or nearly so, from iron, a result which has never hitherto been attained commercially, has been invented by Mr. F. LAUR, of Paris, who proposes to pour, for example, about 440 lbs. avoirdupois of sulphuric acid, of 50° Beaumé, into a leaden vat or lead-lined tank, and raise the temperature thereof by a jet of free steam. When the sulphuric acid commences to boil he adds thereto from about 242 to 286 lbs. avoirdupois of bauxite (hydrate of alumina) in the form of powder. After a few minutes a powerful reaction takes place, the mixture (which before the reaction should not occupy more than about one-fifth the capacity of the vat) overflowing the sides of the vessel unless care be taken to add thereto at this moment about 13 to 14 gallons (more or less) of water. The mixture is then allowed to remain in the vat, and should it recommence to overflow more water is to be added. After the expiration of about one hour the mixture will have returned to its original volume. More water may then be added at will, according to the degree of concentration required, thus obtaining a solution of sulphate of alumina containing about ½ per cent. of iron in combination. The silica of the bauxite and the bauxite not attacked deposit slowly, and may be readily separated by decantation.

In order to obtain sulphate of alumina free from iron it is simply necessary to introduce plates of old zinc into the solution of ferrugenous sulphate (say, from about 6½ to 11 lbs. in the example given). The zinc is attacked, and after four or five hours (under heat) or one or two days (under cold) the iron will be precipitated in the form of a black powder, which deposits at the same time as the silica. After this deposition has been accomplished the limpid solution, which is absolutely neutral, and does not turn bluish in presence of prussiate of potash, is to be decanted or syphoned off. With the quantities given above about 660 lbs. avoirdupois of sulphate of alumina in solution is obtained, which is to be concentrated to about 45° Beaumé (under heat), and poured into casks in the ordinary manner.

It is essential to employ a bauxite reduced or ground to a very fine state of division, or to raise the proportion in order to obtain at once a neutral or nearly neutral solution, the elimination of the iron being based on the fact that whilst in an acid solution of ferrugenous sulphate of alumina the metallic zinc allows only the iron (Fe^2 O) to pass to the minimum of oxidation (Fe O), in a neutral solution it precipitates entirely the peroxide of iron and replaces it. The new product obtained by the improved process is a sulphate of alumina possessing the special characteristics—1, it is completely exempt from the presence of free acid; 2, it is not hygrometric, and consequently does not absorb moisture; 3, it is capable of being ground to any degree of fineness; and 4, the percentage of basic matter that is formed in the sulphate of alumina may extend to 20 per cent., but is never less than 18 per cent.

STEAM HEATING.—A company is trying to get permission from the New York Board of Aldermen to lay lines of steam pipes along the streets of the city for the purpose of supplying to the citizens steam for heating and cooking purposes, as gas and water are now supplied. There is here a good opportunity to apply some of the lessons of experience. Every city that has permitted the laying of gas and water pipes by private corporations has had occasion to regret that it did not in the beginning take the business into its own hands, or else secure to itself the power to regulate charges made for the service. It is not at all improbable that steam heating may become as common in 1900 as is the use of gas to-day, and when permission is given to lay the pipes there should be some sensible preservation of power calculated to protect the public interests. Special privileges of this kind should be paid for outright, or else the community that grants them should be amply protected from the abuses to which they may give rise.—*Philadelphia Public Ledger.*

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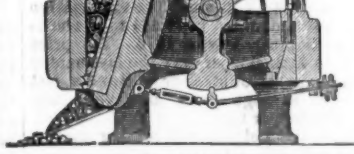

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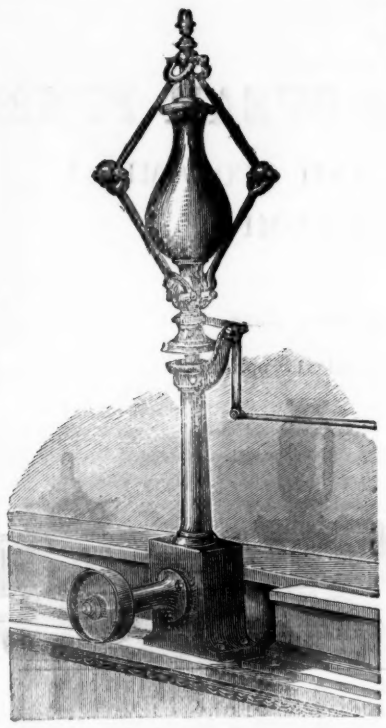

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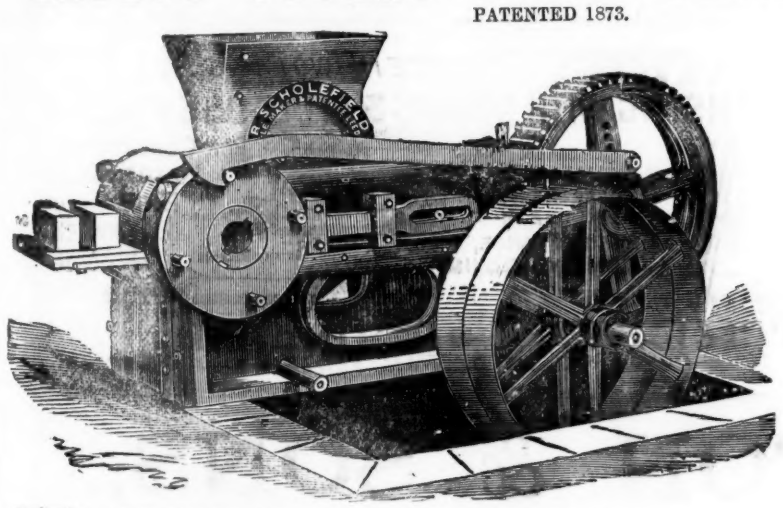
LATEST PATENT BRICK-MAKING MACHINE.

PATENTED 1873.



R. S. begs to call the attention of all Colliery Owners in particular to his PATENT SEMI-DRY BRICK MACHINE, and the economical method of making bricks by his patent machinery from the refuse that is taken from the pits during the process of coal-getting, which, instead of storing at the pit's mouth (and making acres of valuable land useless) is at once made into bricks at a very small cost, by R. S.'s Patent Brick-making Machinery. If the material is got from the pit hill, the following is about the cost of production, and the hands required to make 10,000 pressed bricks per day:—

2 men digging, each 4s. per day	£0 8 0
1 man grinding, 4s. 6d. per day	0 4 6
1 boy taking off bricks from machine, and placing them in barrow ready for the kiln, 2s. per day	0 2 0
1 boy greasing, 1s. 6d. per day	0 1 6
1 engine-man, 5s. per day	0 5 0
1 man wheeling bricks from machine to kiln, 4s. per day	0 4 0
Total cost of making 10,000 pressed bricks	£1 5 0, or 2s. 6d. per 1000.

(SETTING AND BURNING SAME PRICE AS HAND-MADE BRICKS.)

N.B.—Where the material can be used as it comes from the pit, the cost will be reduced in digging.

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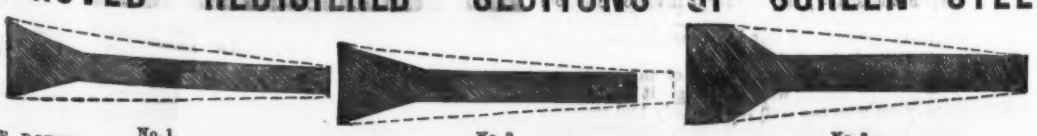

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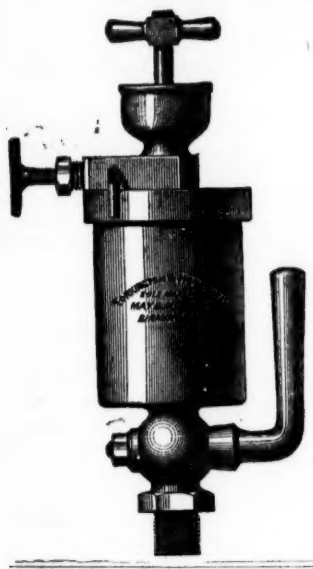

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6	5	50 70	60 0
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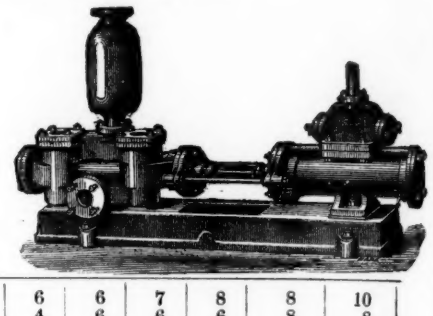

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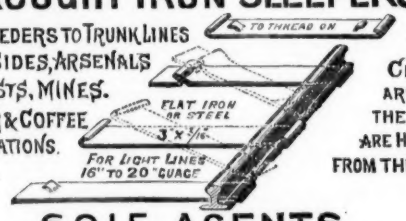
FORESTS, MINES.
SUGAR & COFFEE PLANTATIONS.



THE OUTSIDE CLIPPING SLEEPERS ARE LAID FIRST, THEN THE INSIDE SLEEPERS ARE HAMMERED UP AS FROM THE DOTTED LINES.

7 MILLIONS OF THESE SLEEPERS ARE IN USE IN ENGLAND, FRANCE, GERMANY, BELGIUM.

CHANNEL IRON SLEEPERS
FOR SINGLE HEADED RAIL WITH OUTSIDE BEARING
2½ TO 4½ WIDE
WOOD KEY
WEDGE KEY
DO-DO- WITHOUT OUTSIDE BEARING
DO-DO- TO THREAD ON — NO KEY

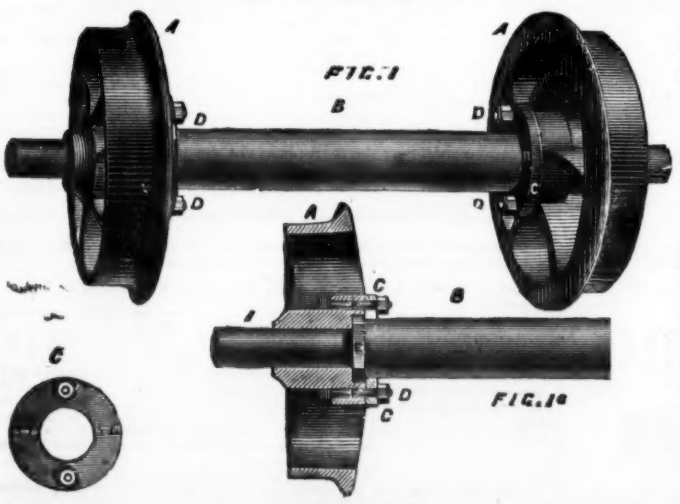
FOR CONTRACTORS. FORTIFICATIONS BRICKYARDS, EARTHWORKS, QUARRIES

SOLE AGENTS, **SHAW BROTHERS,** BIRMINGHAM
DRAWINGS & PARTICULARS ON APPLICATION. TO SAVE TIME PLEASE GIVE GUAGE, WEIGHT OF RAIL AND KIND OF TRAFFIC.

JOSEPH FENTON & SONS,

MANUFACTURERS OF
CAST STEEL AND FILES,
AND
CRUCIBLE CAST STEEL CASTINGS,
Sykes Works, Eyre-st. & Bridge-st., Sheffield. London Office: 118, Cannon-st., E.C.

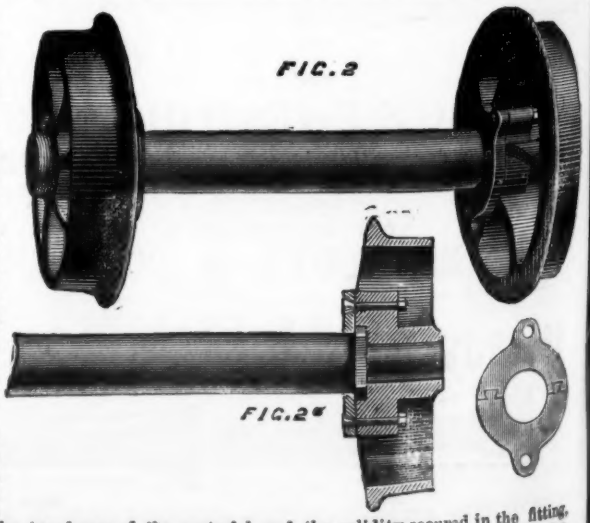
A New Patent Method of Fitting up Wheels and Axles.



Figs. 1 and 1a show a longitudinal view and plan of a pair of corf wheels and axles fitted up for outside bearings, and Figs. 2 and 2a for inside bearings. A A, are the wheels; B, is the axle; C C, the washers; D D, the bolts; E, the collar on axle B; and F, the recessed boss in the wheel.

The wheel is cast with a recessed boss in the inside, made to any shape, corresponding in shape and depth with a collar formed on the axle, which is forged of solid steel; the axle is secured into the recess partly by being sufficiently tightly fitted to require driving home with a hammer, and partly by the washer. Around the axle adjoining the boss is fixed the washer, made in two parts and dovetailed, so as to allow of being fixed after the collar has been forged on the axle. The washer is secured to the boss by bolts and nuts, both in outside and inside bearings; in the case of inside, by means of lugs cast on the boss, and the washer made of corresponding shape; the washer is made of crucible cast steel. The only tool required for fitting is an ordinary spanner for outside bearings, and a box spanner for inside bearings.

Now what are the advantages of this method? You secure a simple way of fitting—it can be done by anyone who has seen it—the only tool required being a spanner; the wheels can be detached from or secured to the axle in a few minutes. The next



advantage is the perfect solidity attained, the wheel and axle practically becoming as one piece. The durability results from the toughness of the material, and the solidity secured in the fitting. Another thing is the wheels do not need to be put in the fire to detach them, as is the case in ordinary wheels. (N.B.—Our wheels cannot be injured by being heated and plunged into cold water, which would render other steel wheels perfectly brittle as glass.) Saving in fuel and wages is evident—no skilled labour being required to refit wheels in case of a strained axle. By adopting this system colliery owners may save hundreds of pounds sterling yearly.

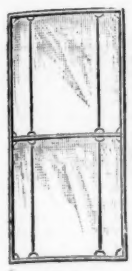
HARRIS'S PATENT WROUGHT-IRON WINDOWS.

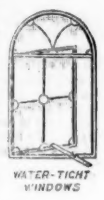
DOME AND OTHER ROOF LIGHTS, FLOOR AND PAVEMENT LIGHTS, ETC.

GREAT BRITAIN,
UNITED STATES OF AMERICA,

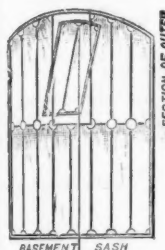
ARE STRONGER, SUPERIOR, AND CHEAPER THAN ANY OTHER METAL SASHES YET PRODUCED—COST LESS FOR GLAZING—ARE AS CHEAP IN MANY CASES AS WOOD

Private Houses,
Parsonage Houses,
Farm Houses,
Churches,
Chapels,
Schools,





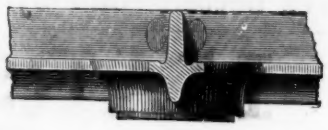
ILLUSTRATED CATALOGUES ON APPLICATION.



In Basement Storeys and Exposed Positions Shutters and Guard Bars are dispensed with.

HOME AND

PATENTED IN

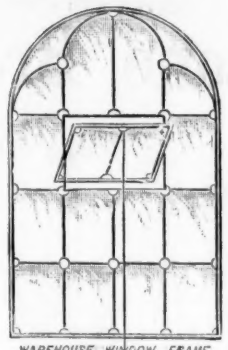


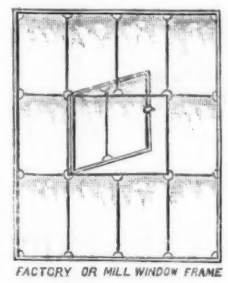
FRANCE,
GERMANY, AND BELGIUM.

—CAN BE DESIGNED AND MANUFACTURED TO SUIT ANY STYLE OF ARCHITECTURE OR POSITION WHERE A WINDOW MAY BE REQUIRED.

ARE BEING EXTENSIVELY USED IN—

Lunatic Asylums, &c.,
Public Buildings, Banks,
Wharves, Warehouses,
Factories, Mills,
Breweries, &c.,
Engine Houses.

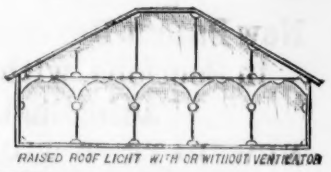


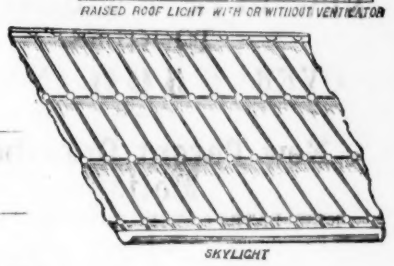


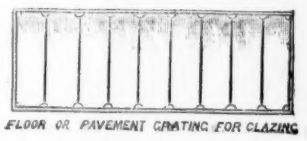
ILLUSTRATED CATALOGUES ON APPLICATION.

Security is obtained in these Skylights without Guard Bars, and with less obstruction to Light.

EXPORT.







SOLE MAKER—J. T. HARRIS, Engineer, Ironfounder, and Manufacturer,
SAFE, STRONG ROOM, AND PARTY WALL DOORS, AND EVERY KIND OF CONSTRUCTIONAL AND BUILDERS' IRONWORK, LIFTS, HOISTS, ELECTRIC BELLS AND TELEGRAPHS, &c.
90, CANNON STREET, LONDON, E.C.; AND BEAUFORT IRONWORKS, BRISTOL.

BOLTS, NUTS, AND COACH SCREWS.

ARCHER AND HARPER,

PROVIDENCE BOLT AND NUT WORKS, THE GREEN, DARLASTON,

Manufacturers of all kinds of Shipbuilders', Engineers', Coach, Wagon, and Fish Bolts: Coach Screws; Railway Spikes and Brobs; Hot-pressed and Forged Nuts, Rivets, Washers, &c., &c.

SHIPBUILDERS' AND RAILWAY STORES' CONTRACTORS.

IMPORTANT.

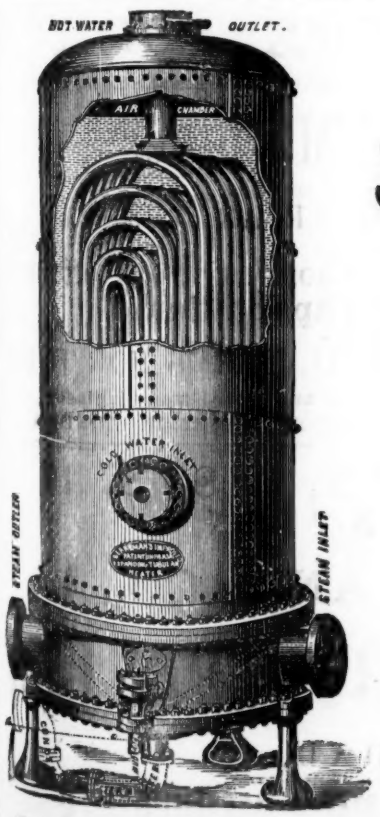
JOSEPH WRIGHT AND CO.

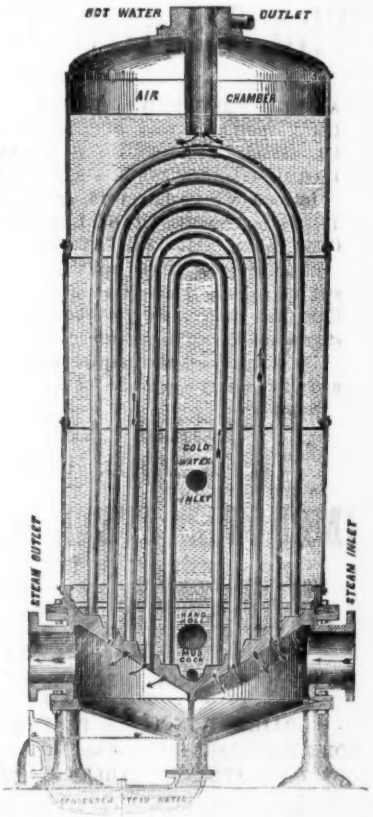
(LIMITED),

NEPTUNE FORGE ENGINE AND BOILER WORKS,

TIPTON, STAFFORDSHIRE,

AND AT 147, QUEEN VICTORIA STREET, LONDON, E.C.





Having purchased the Engineering Business lately carried on by R. BERRYMAN AND CO., at 23, Congreve-street, Birmingham, and 28, Wilson-street, Finsbury-square, London, have removed the whole to their Works at TIPTON, to which place ALL COMMUNICATIONS SHOULD IN FUTURE BE ADDRESSED, and where the BERRYMAN HEATER can be seen at work, and in every stage of manufacture.

Being the SOLE MAKERS and PATENTEES of these CELEBRATED COAL SAVERS and EXHAUST STEAM UTILISERS, and having remodelled and greatly improved them, adding largely to their HEATING SURFACE and WATER CAPACITY, J. W. and Co. have put down a special plant, which includes an entire new set of improved patterns, enabling them to offer these FEED WATER HEATERS to the public at

GREATLY REDUCED PRICES.

This arrangement of BRASS TUBES of a great length giving an enormous HEATING SURFACE makes this HEATER not only the MOST POWERFUL ever invented, but its FIRST COST PER FOOT OF HEATING SURFACE IS LESS THAN HALF THAT OF ANY OTHER. It will condense the whole of the Exhaust Steam from the Engine if required, and entirely does away with the NOISE and BACK PRESSURE from exhaust pipes.

ALL THE TUBES ARE OF SPECIALLY PREPARED SOLID DRAWN BRASS AND COPPER; both ends are expanded into the bored holes of the same Tube Plate, METAL to METAL, and every tube is free to expand and contract independent of each other. Leakage is impossible, as, when the tubes are once fixed, nothing short of cutting out will remove them. No scurf adheres to the tubes because of the difference of expansion between SCURF and BRASS. The inside of the Heater can be washed out by means of the mud cock and hand hole whilst at work.

Only one pump or injector is required, and as the Heater is placed between the pump and the boiler, the water is forced, COLD, into it, and passes out at the top HOT into the boiler direct. Where the WATER WORKS PRESSURE is sufficient no pump or injector is needed.

The water being heated to BOILING POINT UNDER PRESSURE in the Heater, a saving of from 20 per cent. to 25 per cent. in fuel is effected; the disastrous results of grease in boilers are also avoided, the sewage and other loose matter in the water being deposited in the Heater, the acids are liberated there instead of in the boiler.

Every part can be lined with BRASS, COPPER, or LEAD, as may be required in special cases for heating water or any kind of liquor in large quantities for CHEMICAL WORKS, BATHS, WASH-HOUSES, AQUARIA, GREENHOUSES, BREWERIES, WOOL WASHING, DYE WORKS, TANNERIES, &c., &c.; they will also HEAT AIR FOR CUPOLAS AND BLAST FURNACES, and are now at work as INTERHEATERS for compound engines with direct steam from the boiler with a further saving of 15 per cent.

The New Price List, with detail information, is now ready, and will be sent on application, together with an Illustrated Catalogue, with references and testimonials from Firms using FOUR HUNDRED AND THIRTY-THREE of these Heaters.

At the PARIS EXHIBITION the Jurors have Awarded

THE GOLD MEDAL, THE SILVER MEDAL, AND HONOURABLE MENTION

FOR MY LATEST PATENTED STONE BREAKERS AND ORE CRUSHERS.

Stones broken equal, and Ores better, than by hand, at one-tenth the cost.

H. R. MARSDEN,

ORIGINAL PATENTEE AND SOLE MAKER OF BLAKE'S

Improved Patent Stone Breakers & Ore Crushers.

New Patent Reversible Jaws, in Sections, with Patent Faced Backs.

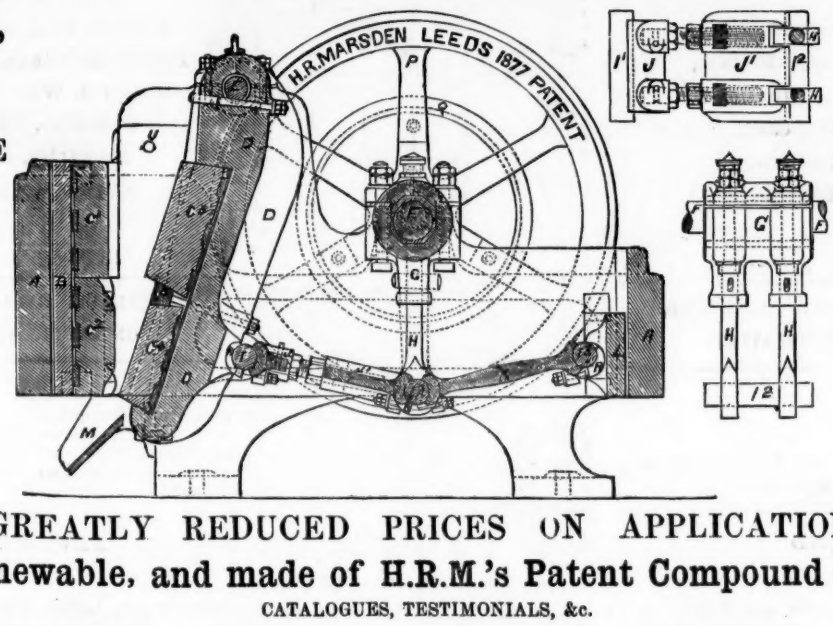
NEW PATENT ADJUSTABLE TOGGLES.

OVER **2500** IN USE.

New Patent Draw-back Motion.

NEW PATENT STEEL TOGGLE BEARINGS.

70 PRIZE MEDALS.



READ THIS—

Wharthole Lime Works, Maryport, Whitehaven, November 7, 1873.

H. E. MARSDEN, Esq., Soho Foundry, Meadow-lane, Leeds.

DEAR SIR,—The machine I have in use is one of the large size, 24 in. by 12 in. The quantity we are breaking daily with this one machine is 250 tons, the jaw being set to break to a size of 2¾ in. We have, however, frequently broken over 300 tons per day of ten hours, and on several occasions over 360 tons during the same period. The stone we break is the blue mountain limestone, and is used as a flux in the various ironworks in this district. We have now had this machine in daily use for over two years without repairs of any kind, and have never had occasion to complain of any inconvenience in using the machine. I hope the one you are now making for me may do its work equally well. The cost—INCLUDING ENGINE-POWER, COALS, ENGINEMAN, FEEDING, and all EXPENSES OF EVERY KIND—is just 3d. per ton. Should any of your friends feel desirous of seeing one of your machines at work, I shall have much pleasure in showing the one alluded to.

I am, dear Sir, yours very truly,
WILLIAM MILLER.

AND THIS—

Wharthole Lime Works, Aspatria, Cumberland, July 11th, 1878.

H. R. MARSDEN, Esq., Soho Foundry, Leeds.

DEAR SIR,—We are in receipt of your letter of 4th inst. I may just state that the stone breaker above named has been under my personal superintendence since its erection, and I have no hesitation in saying that it is as good now as it was five years ago.

I am, dear Sir, yours faithfully,
FRANCIS GOULD.

GREATLY REDUCED PRICES ON APPLICATION.

ALL BEARINGS are renewable, and made of H.R.M.'s Patent Compound ANTIFRICTION METAL.

CATALOGUES, TESTIMONIALS, &c.

H. R. MARSDEN, SOHO FOUNDRY, LEEDS, ENGLAND.

TO COLLIERY AND MINE OWNERS.

R. HUDSON'S PATENT STEEL CORVES OR "TRAMS."

Patented July, 1875, and January, 1877.

Entire new principle, saving three-quarters to 2 cwts. "dead" weight per corve. Will hold 2 to 3 cwts. more coal than the ordinary kind, *without increasing the outside dimensions.* Adopted by—

Messrs. THOMPSON, WISE, & Co., Burry Port, South Wales.
Messrs. DYMONDS' Liversedge Coal Company, near Leeds.
Messrs. W. ACKROYD and BROS., Morley, near Leeds.
Messrs. CLAYTON and SPRIGHT, Farnley, near Leeds.
Messrs. JAS. WORMALD and SONS, Rawdon, near Leeds.
KINGSWOOD COAL AND IRON CO., near Bristol.
MIDDLETON COLLIERY CO., near Leeds.
Messrs. BARING, GOULD, & ATKINSON, Diamond Fields, South Africa.
Messrs. KIMBERLEY, Diamond Mines, South Africa.
Mr. HASELDEN'S Lead Mines, Linares, Spain.
FRYSTON COLLIERY CO. (Limited), Castleford, near Leeds.
HOWDEN CLOUGH COLLIERY CO. (Limited), near Leeds.
NEWTON COLLIERY, near Castleford.
Messrs. R. HOLLIDAY and SONS, Ardsley, near Wakefield.
HARDWICK COLLIERY CO., Clay Cross, near Chesterfield.
WEST YORKSHIRE IRON AND COAL CO. (Limited), Tingley, near Leeds.
WM. BAIRD and SON, Coatbridge, near Glasgow.
BETTISFIELD COLLIERY COMPANY, Bagillt, Wales.
EDFORD COLLIERY COMPANY, near Bath.
Messrs. RUSHFORTH and Co., Adwalton, near Leeds.
Messrs. JAS. FUSSELL, SONS, and Co., Frome, Somersetshire.
T. VAUGHAN and Co.'s TRUSTEES, South Medomsley Colliery; and others.

R. HUDSON, Engineer and Ironfounder, Gildersome Street Foundry, near Leeds *(Five minutes walk from Gildersome Station, G.N.R.)*

The Barrow Rock Drill COMPANY

Are NOW PREPARED to SUPPLY their DRILLS, the ONLY ONES that have been SUCCESSFULLY WORKED in the MINES of CORNWALL. At DOLCOATH MINE, in the HARDEST known ROCK, a SINGLE MACHINE has, since its introduction in July, 1876, driven MORE THAN THREE TIMES the SPEED of HAND LABOUR, and at TWENTY PER CENT. LESS COST PER FATHOM.

In ordinary ends two machines may be worked together, and at a proportionately increased speed. They are strong, light, and simple, easily worked, and adapted for ends and stopes, and the sinking of winzes and shafts.

The company are also prepared to SUPPLY COMPRESSORS, and all necessary appliances for working the said Drills.

Apply to—

LOAM AND SON,
LISKEARD, CORNWALL.

IMPROVED STEEL WIRE FOR ROPES.

WEBSTER & HORSFALL,

(ORIGINAL PATENTEES),

MANUFACTURERS OF IMPROVED STEEL WIRE FOR ROPES FOR COLLIERIES,

RAILWAY INCLINES, PLOUGHS, HAWSERS, &c.

SOLE MANUFACTURERS of the HOMOGENEOUS WIRE for the ATLANTIC CABLES of 1865 and 1866.

WEBSTER AND HORSFALL,
BIRMINGHAM.

THE GREAT ADVERTISING MEDIUM FOR WALES.

THE SOUTH WALES EVENING TELEGRAM (DAILY), and SOUTH WALES GAZETTE (WEEKLY), established 1857,

he largest and most widely circulated papers in Monmouthshire and South Wales CHIEF OFFICES—NEWPORT, MON.; and at CARDIFF.

The "Evening Telegram" is published daily, the first edition at Three P.M., the second edition at Five P.M. On Friday, the "Telegram" is combined with the South Wales Weekly Gazette," and advertisements ordered for not less than six consecutive insertions will be inserted at an uniform charge in both papers.

P. O. O. and cheques payable to Henry Russell Evans, 14, Commercial-street Newport, Monmouthshire.

THE IRON AND COAL TRADES' REVIEW.

The IRON AND COAL TRADES' REVIEW is extensively circulated amongst the Iron Producers, Manufacturers, and Consumers, Coalowners, &c., in all the iron and coal districts. It is, therefore, one of the leading organs for advertising every description of Iron Manufactures, Machinery, New Inventions, and all matters relating to the Iron, Coal, Hardware, Engineering, and Metal Trades in general.

Offices of the Review: 7, Westminster Chambers, S.W.

Remittances payable to W. T. Pringle.

THE "CHAMPION" ROCK BORER

MINE AND QUARRY STANDS, STEEL DRILLS, SPECIALLY PREPARED INDIARUBBER HOSE, TESTED IRON PIPES, &c.

Air-Compressing Machinery,

Simple, strong, and giving most excellent results, and

ELECTRIC BLASTING APPARATUS.

Full particulars of rapid and economical work effected by this machinery, on application.

CONTRACTS TAKEN, OR SPECIAL TERMS FOR HIRE.

ULLATHORNE AND CO., Mechanical and Consulting Engineers, 63, QUEEN VICTORIA STREET, LONDON, E.C.

PARIS EXHIBITION, 1878.

HONOURABLE MENTION

Has been awarded to

SALMON, BARNES, AND CO.,

FOR THEIR

PATENT ROANHEAD ROCK DRILL,

AND THE HIGHEST AWARD,

A SILVER MEDAL,

FOR

IRON AND WOOD REVOLVING SHUTTERS,

Worked by their PATENT BALANCE-WEIGHT MOTION.

Canal Head Foundry and Engineering Works, Ulverston, LANCASHIRE.

J. WOOD ASTON AND CO., STOURBRIDGE

(WORKS AND OFFICES ADJOINING CRADLEY STATION),

Manufacturers of

CRANE, INCLINE, AND PIT CHAINS,

Also CHAIN CABLES, ANCHORS, and RIGGING CHAINS, IRON and STEEL SHOVELS, SPADES FORKS, ANVILS, VICES, SCYTHES, HAY and CHAFF KNIVES, PICKS, HAMMERS, NAILS, RAILWAY and MINING TOOLS, FRYING PANS, BOWLS, LADLES, &c., &c.

Crab Winches, Pulley and Snatch Blocks, Screw and Lifting Jacks, Ship Knees, Forgings, and Use Iron of all descriptions.

STOURBRIDGE FIRE BRICKS AND CLAY.

Printed by RICHARD MIDDLETON, and published by HENRY ENGLISH (the proprietors) at their offices, 26, FLEET STREET, E.C., where all communications are requested to be addressed.—*September 28 1878.*